THE IRON AGE

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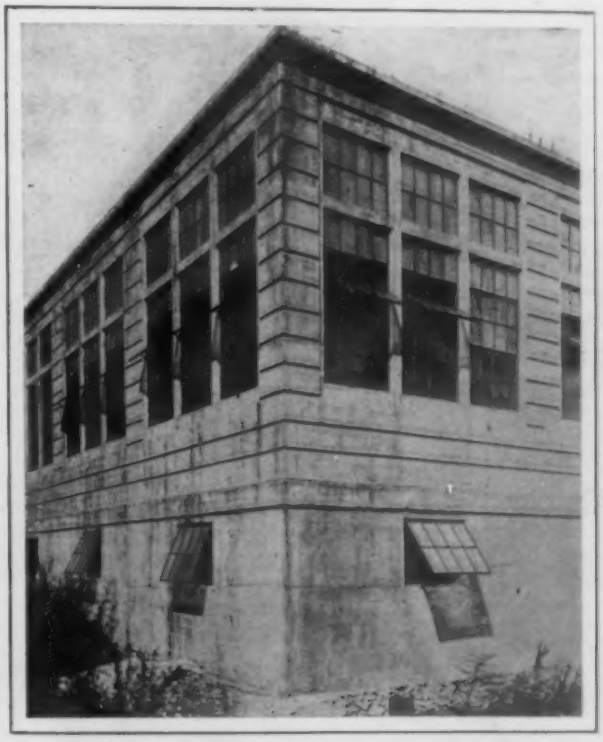
A Home-Made Reinforced Concrete Factory

Nash Engineering Company's Widely-Applicable Construction Methods—Beams Provide for Shafting, Wiring and Craneways

The Nash Engineering Company, South Norwalk, Conn., manufacturer of air compressors, vacuum pumps and other machinery, is occupying a new factory of solid reinforced concrete, which is of unusual interest from the fact that it is home-made in all of its essential details of construction. It illustrates what can be accomplished by mechanical engineers who are untrained in concrete work, with no other assistance than that afforded by three or four local expert carpenters, equally inexperienced in the task, who made and set up the forms in the process of building, together with wholly unskilled laborers who did the heavy work. A structure 135 ft. square, one story and basement, with walls and columns designed to sustain three additional stories, was completed from the foundation piers within three months from the day when pouring commenced. The cost showed a large saving from the estimates which had been submitted by contractors. The result is a massive structure, so completely proof against fire in itself and in its contents as to make insurance unnecessary.



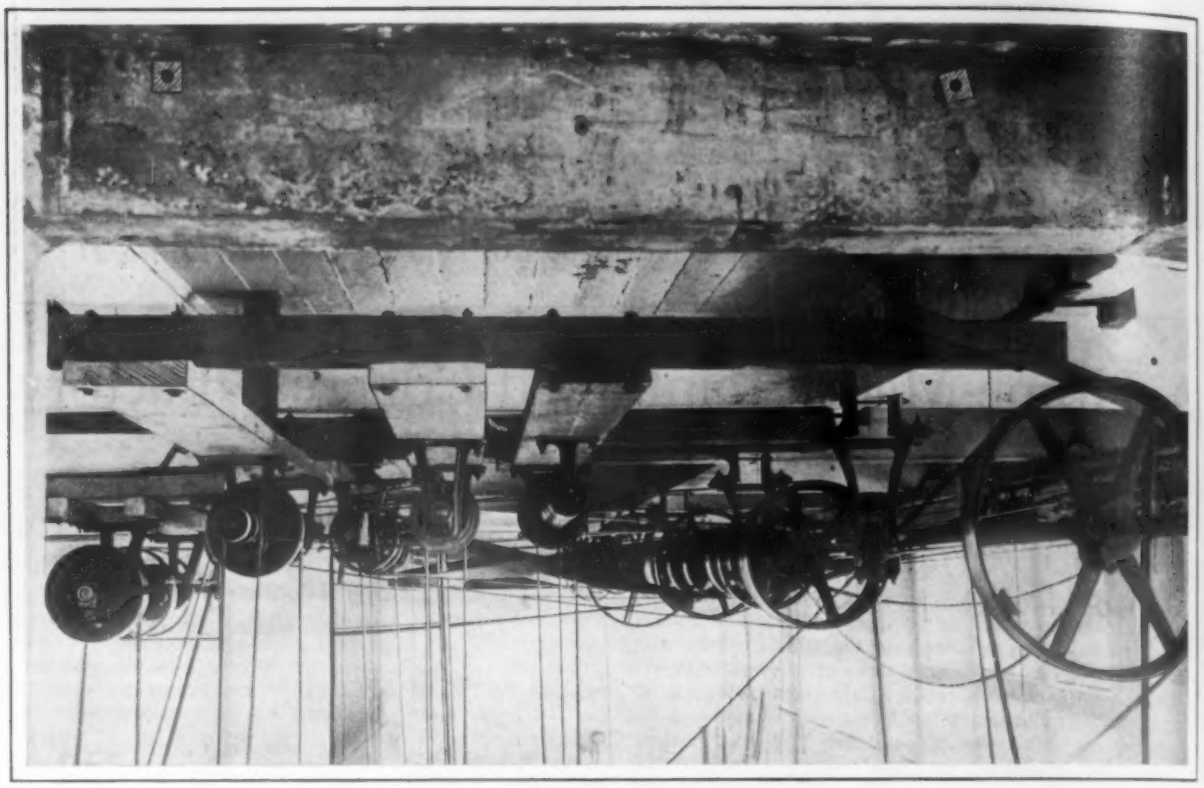
A Corner of the Nash Engineering Company's New Concrete Factory

The engineers were quick to meet the difficulties which confronted them in the beginning of their task, and various improvements in methods were evolved as the work progressed. A concrete mixer was purchased, but practically all other equipment employed on the work was designed at home, including a bending machine. This consists of a casting, bolted to a bench, having square lugs on its upper surface which form a groove to hold the rod, and a hollow lever handle carrying a hardened steel roll. The handle, lengthened by a heavy steel pipe, brings the roll against the rod with such power that the desired forming is accomplished with little manual effort. The device is also arranged to bend the double-ended hooks used to hold the reinforcing fabric in position in the forms.

The forms for molding the concrete were designed for repeated use through the various units of the building. In this work the experience gained in pattern making was of great assistance. As soon as the concrete had set sufficiently the forms were taken down and set up again in new positions. The floor forms were used at least ten times. No lumber was destroyed, which meant a large saving in cost of labor and material as compared to the usual practice. A system of bolting together was developed, so that as a unit of the building was completed the task of removing the forms was easily accomplished by unskilled men. In fact the forms are now stored for use in the future when the additional stories shall be constructed.

In securing these results the bolts were passed through wooden blocks which served as distance pieces. They were 2 in. square, with a 1-in. hole bored through them longitudinally, which permitted the free passage of a bolt. Wooden pins were also inserted in the girder forms at regular intervals, usually three to a girder. Ordinary 1-in. dowel pins, cut to proper length, were used for the purpose. The ends of each were counter-drilled, to receive the points of nails, holes for which were drilled in the forms, which insured correct spacing. When the forms were removed the square and round wooden pieces were left imbedded in the concrete. The former give insulated surfaces for electric wiring. Their removal opens spaces of sufficient size to admit the passage of larger bodies, such as piping. The holes created by the knocking out of the round pins afford supports for hangers and trolleys, as well as for hoists, and for tackles and other permanent and temporary apparatus. The beams are of uniform depth. Therefore, wire, pipes, shafting, trolley tracks may be run in either direction, parallel or at right angles, and in perfect alignment. Countershafting, even where unusually complex, may be put up with a minimum of planning and labor, as will be noticed from the engraving at the top of page 1150. The three countershafts of a grinding machine, as shown, were set up with very little trouble.

Where the square blocks were used in the side walls they were knocked out and the holes filled by what may be called a squeeze gun, consisting of a square, box-like barrel and a plunger. Placing the muzzle against the entrance of the hole, one stroke of the plunger filled the

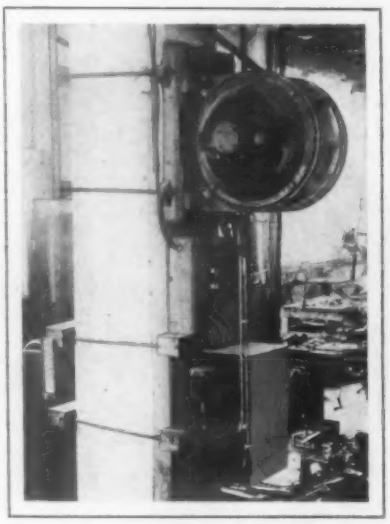


View of the Concrete Beams Showing the Method of Suspending Line and Countershafting with Special Brackets by Utilizing Holes in the Beams

space with concrete, and a man working outside the building smoothed off the surface on that side. To fill these holes by hand and trowel would be a long, expensive task.

The company's engineers designed special brackets to support the shaft and countershaft hangers, as shown in the cut at the bottom of page 1150. With the former a bracket is placed at each side of a beam and fastened in place by a bolt passing through the hole *a* and a round beam hole, and a second bolt through the hole *b*, which is below the beam. The hanger is bolted through the hole *c* in the horizontal face of the bracket.

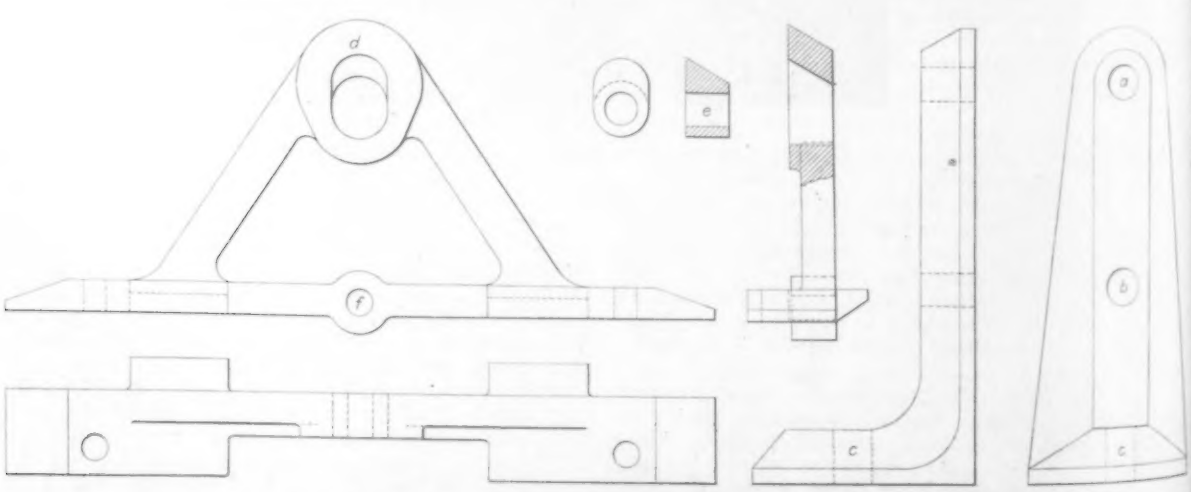
In the countershaft bracket it is necessary to bring the lug *d* hard up against the bottom of the beam to prevent rocking. To accomplish this a taper bushing, *e*, is employed, working in a taper hole. As a result the action of the bolt effects the rigid hold



A Simple Method of Installing an Electric Motor

of the lug. A second bolt passing through the hole *f* clamps together the two opposing brackets, or a bracket and a block, as shown at the extreme right in the upper cut on page 1150. It will be noticed that the clamping action of the lug is so great that a heavy weight may be applied at one end of the bracket and none at the other, without tipping.

The pouring was done in large units. For example, practically the whole upper floor of the section shown on page 1149 was included in a single mold, comprising the walls, window space, cornice and roof. The window frames were cast solid with the concrete, securing such a solidity that the hardest gale cannot find its way in, nor are its sounds noticeable. The method employed was to hang the steel sash in the form, protecting it as shown in the detail drawing on page 1152. Planks and blocks, together with

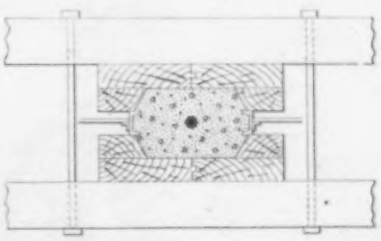


The Two Types of Special Brackets Employed for Suspending Shafting

A Section of the Ceiling with the Panel Forms Used for Insulation Against Cold

the sash edge constituted the form for the window column, leaving open the space occupied by the sash. The concrete flowed around this space, the mold holding the sash firm in its grip.

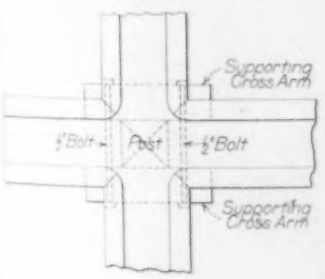
In molding the beams and the panels between them the first step was to bolt the column forms together. These forms were used for the columns of both the basement and upper story, the required additional length being bolted on. Incidentally the forms for the walls of the basement were pieced out by bolting for the purposes of the main story. The column forms were set up on end at intervals to give a 15-ft. bay, and were levelled up to the required hight, 17 ft., and plumbed and braced. The bays are divided into 7½-ft. panels. At each corner of the panels was set up a 4 x 4 in. post, having bolted to it at the top two short cross-arms at the level of the bottom of the girder forms, which they supported. The details of the method are shown on this page. The forms were placed roughly in position and were exactly lined by a block placed on top of the post, having corners scalloped to conform with the shape of the girder form. The block, with its post, was permitted to remain in place for a considerable period, until the concrete had become thoroughly hardened, but the forms were taken down after two or three days, when the concrete was still green. The ingenuity of this method will be readily seen; the post and block were not interfered with in the handling of the forms, which otherwise would have had to remain in position for many days longer.

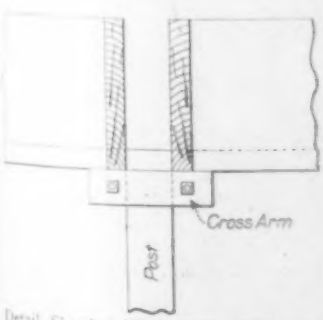


Details of Wall Construction with Method of Casting Window Frames Into the Solid Concrete

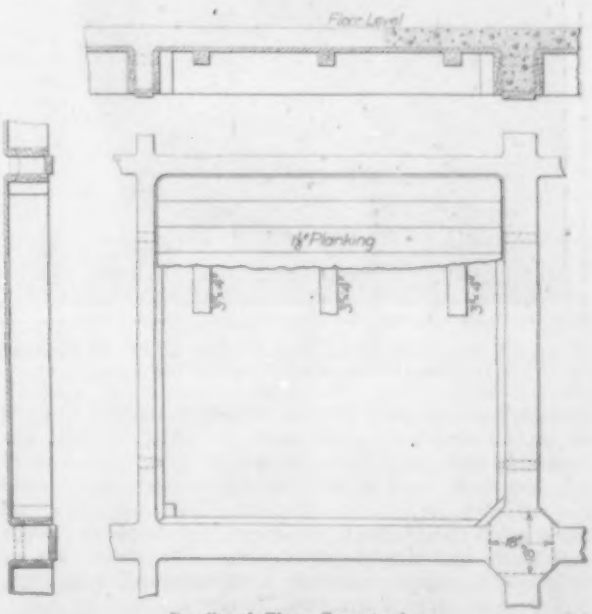
The windows of the basement floor are protected in an unusual manner. The vertical bars are of flat steel, drilled to take the horizontal twisted reinforcement. The grating was put in after the wall was completed, the area about the inner edge of the window being left for a subsequent pouring of concrete with the bars in position.

At the top of this page is shown a novel use of the panel forms. Last winter the heating apparatus of the plant was not installed, and the makeshift was inadequate. The roof was merely the floor of the story to be built above, and the radiation was a considerable item. The forms were set in place, held by plugs in the dowel pin





Detail Showing Method of Supporting Forms



Details of Floor Construction

holes, and a satisfactory insulation resulted. Incidentally the building has been through a year of weather exposure with no other roof protection than the floor, but leakage has been so trifling as to constitute little annoyance. A single coating of asphalt and paper will suffice to complete the protection until the building is raised.

A simple and effective method of fastening a motor to a concrete column is used in portions of the plant. It is mounted on a massive wooden frame which is strapped by a series of bolts to a similar frame at the back of the column. The vibration of the running motor is inappreciable.

A New Storage Battery Industrial Truck

For conveying materials around manufacturing plants, repair shops and steamship and railroad terminals, etc., the C. W. Hunt Company, West New Brighton, N. Y., has built a new storage battery truck. It can be employed in conjunction with an industrial railway system to operate in cross aisles or in buildings which are not served by the tracks of the main system, and it can of course be taken to different floors by means of the ordinary freight elevator and be run directly into freight cars.

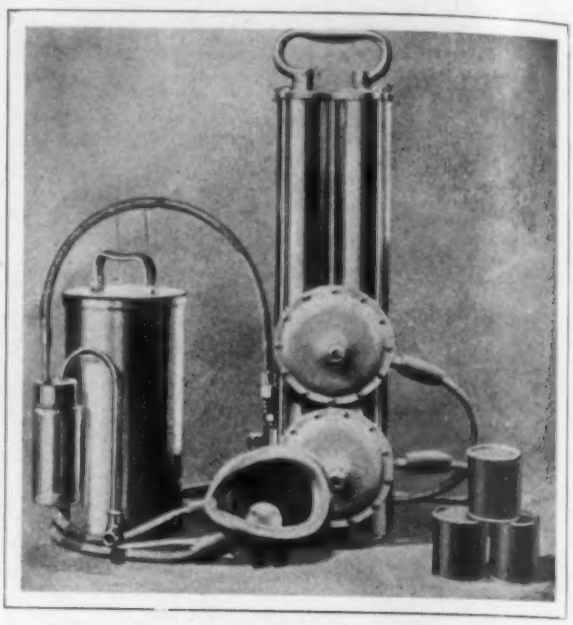
The steering and control levers are arranged so that the operator has complete control of the truck without removing his hands from them. The truck is steered by the lever on one side of the operator's platform at the end of the truck and the motor is controlled by the other lever, while the brake is actuated by a foot pedal not visible. The controller is of the drum type, having three forward and three reverse speeds, with a positive stop between. Resistance is not employed for regulating the motor speed, the varying voltage required being secured by different groupings of the storage battery cells. In this way, it is pointed out, all of the energy delivered by the batteries is utilized for driving the motor and none is wasted in heating up resistances. It is possible to turn the truck on a short radius and when not in operation it is always locked.

The trucks have a capacity of approximately 40,000 lb. The speed when loaded is 5 miles per hour as a maximum. Either Edison iron and nickel cells or Exide lead cells are used for the storage battery, which is incased in a battery box of heavy steel, suspended by springs from the cross members of the frame. The top of the truck over the battery box is removable, thus providing ready access to the cells. The motor is designed for vehicle service and drives the wheels through a differential of cut steel gearing, which is entirely inclosed in an oil and dust proof housing. The current consumed by the motor is 30 amperes at 35 volts at a speed of 1000 r.p.m., and it will take 120 amperes at 36 volts for 10 min. without overheating. This high overload capacity is relied upon to enable the truck to handle full loads on fairly heavy grades. The wheels are of steel cast in one piece and are mounted on roller bearings. Solid rubber tires of demountable type are used.

A Recently Developed Storage Battery Truck for Use in Industrial Plants Transporting a Load of Castings

Device for Inducing Respiration Artificially

Among the various appliances for artificially inducing respiration, the Lungmotor manufactured by the Life Saving Devices Company, Chamber of Commerce Building, Chicago, Ill., embodies the important features of regulation and protection. It is pointed out that by a positive adjustment of the stroke of the plunger the volume of air delivered at each stroke may be regulated throughout the entire range of requirements from the largest adult down to the infant. The air passages are also arranged so that the flow of air into and out of the lungs reproduces the natural tidal flow. In the accompanying cut the safety diaphragms forming a part of the apparatus are shown. These automatically control the pressure at which the air is forced in, so that a maximum of 4¾ oz. cannot be exceeded, whatever the plunger action may be. If desired, these diaphragms can also be regulated for other pressures.



An Appliance for Inducing Respiration Artificially and Having Means for Regulating the Volume of Air

The upward movement of the plunger of the Lungmotor fills one cylinder with air, oxygen, or a mixture of both, according to the adjustment of the air and oxygen valves at the bottom of the cylinder. The air from the lungs of the patient is simultaneously drawn into the second cylinder, and with the down stroke of the plunger the fresh mixture is forced into the lungs from one cylinder and the exhausted air delivered from the other. The cycle of operations is repeated as long as may be necessary, the connections to the mouthpiece being so arranged that it is impossible to confuse the functions of the two cylinders.

Accidents in Steel Works Yards

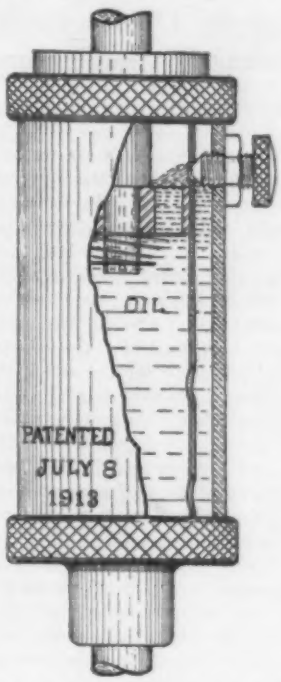
An analysis of the cause of yard department accidents in 1912 of the Inland Steel Company is presented in the company's safety bulletin No. 9, October, 1913, issued by the Department of Safety, Sanitation and Relief, J. D. Smith, safety inspector. The record is given in a little article by W. J. Rossman, superintendent of yards, and the list is as below, although it may be stated that while the accidents caused a loss of 491 days of time on the part of the men injured, only 6 per cent. of the accidents caused a loss of over 10 days per individual and none over 35 days' time.

Per Cent. of Total of Different Yard Accidents

Handling material injured self with same	42
Struck by falling material	12
Slipped, stumbled, jumped or fell	8
Accidentally struck by another's shovel, pick, etc.	7
Wrench or bar slipped, or struck with his tool	6
Chip flew and struck him	4
Caught or struck by crane chain, hook or load	3
Stepped on a nail	3
Ran or bumped into an obstacle	3
Opening car door or working in car when moved	1
Burned by hot steam pipe or exhaust	1
Miscellaneous	9

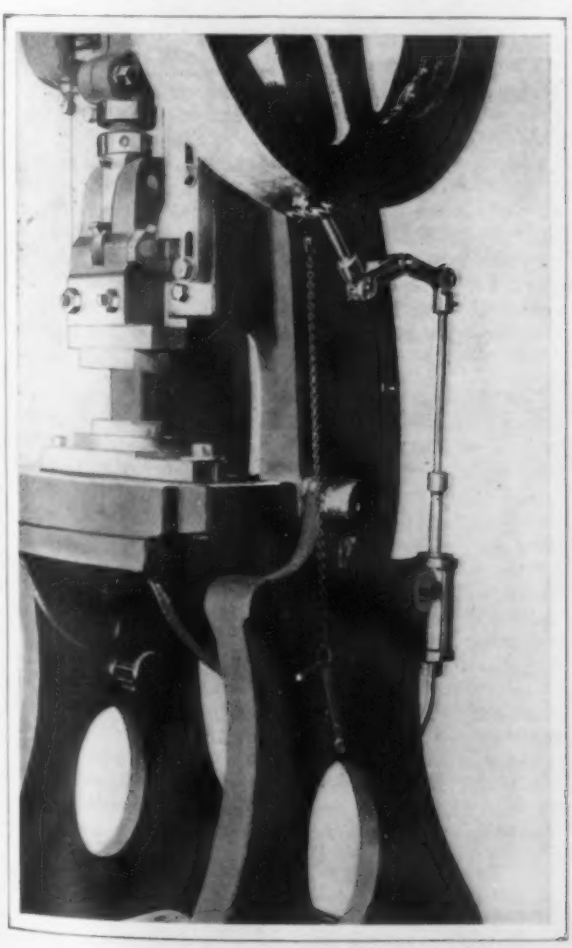
Improved Safety Device for Punch Presses

A safety device designed to insure positive action, but also incorporated in the machine itself, has been placed on the market by Bowdle & Co., 507 Jackson boulevard, Chicago, Ill. The function of the device is to prevent the operating clutch from engaging when the treadle is pressed down, except when it is actuated by a sharp impulse, such as would be given intentionally. The device, the construction of which is shown in the accompanying line drawing, consists of a two-chamber cylinder with a connecting by-pass, the size of which is controlled by a regulating needle and a piston that is a part of the treadle rod. The cylinder is made of brass tubing and is partly filled with oil.



A New Safety Device Designed to Prevent Accidents with a Punch Press

The application of the device to a punch press is brought out in the accompanying halftone. A quick, sharp stroke of the treadle forces the cylinder upward, this motion being communicated through the oil to the piston, which in turn acts through the latch rod, releasing the clutch and allowing it to engage. During this time the oil under pressure in the cylinder has been flowing through ports at the bottom into the outer shell and thence through the by-pass to the other side of the piston. The pressure on the piston is thus equalized and the action of gravity is relied upon to return the piston to the starting position and prevent the press from repeating. When the pressure on the treadle is removed the cylinder returns to its normal starting position and the oil which had flowed to the top of the piston is drawn back to the lower side through piston check valves and the machine is ready for the next operation. Emphasis is laid upon the fact that any motion other than a quick positive one, transmitted to the cylinder, will result in the oil moving through the by-pass instead of giving an impulse to the piston, the size of the pass being regulated to suit the machine and the speed at which it operates.



The Device Applied to a Punch Press

Great Power Plant at Chattanooga

The completion of a large hydroelectric power plant at Hale's Bar, on the Tennessee River, 33 miles from Chattanooga by boat, and 12 miles by power line, was elaborately celebrated November 13 by citizens of Chattanooga, with addresses lauding the enterprise, which is backed by New York capital. Joining in the celebration were capitalists and leading figures of New York and other Eastern cities. Soon after 1 o'clock a gigantic sign on the James Building announced that the dynamos at the power plant had started on a work for which it had taken more than eight years to prepare and which cost about $10,000,000.

The building of the dam at Hale's Bar has resulted in the formation of a lake 30 miles long and of a stage varying from 35 ft. at the dam to 8 ft. at Chattanooga above the former low-water mark. Two river steamers easily slipped through the lock that had been constructed at one extremity of the dam. It is the heaviest lift lock in the world except one, according to Charles M. Jacobs, of New York, who was one of the guests at the celebration.

With the completion of this power plant, the largest in the South, Chattanooga is in the center of a series of developments which, when entirely completed, will produce 250,000 hp. at cheap rates and designed for manufacturing industries. Already in operation in that vicinity are two plants on the Ocoee River, with an aggregate of 50,000 hp., and the one at Hale's Bar, with a possible maximum of 100,000 hp.

Bury Compressor Trade Growing

The Bury Compressor Company, Erie, Pa., is enlarging its plant by a 100-ft. extension to its main building, which is 70 ft. wide. When this is completed the building will be 550 ft. long. The room provided by the extension will double the capacity of the erecting floor used in connection with the building of the company's three-cylinder variable volume compressors. Among recent orders taken by this company are the following: Three-cylinder variable volume machine, capacity 2000 cu. ft. per min., for the Lake Shore Railroad; Duplex compound variable volume, 800 cu. ft., for the Timken-Detroit Axle Company, Detroit, Mich.; similar machine, 700 cu. ft., for the National Tube Company; special machine for the New York City water department; low pressure single stage, 800 cu. ft., for the Western Electric Company; special compound duplex, 800 cu. ft., operated by steam in winter and belt driven in summer, for the Toronto Structural Steel Company, Toronto, Ont.; seven single stage machines for the Ford Motor Company, Detroit, Mich.; duplex compound, 750 cu. ft., for the Otis Elevator Company, and compound air and steam, 1500 cu. ft., for the insane asylum in Norristown, Pa. The company reports its October orders the largest ever received in any one month.

William H. Jones, of Munhall, Pa., and Andrew F. Mitchell, of Homestead, Pa., have been granted a patent (1,076,768) for treating steel and steel alloys. Their method of treating super-carburized steel consists in decarburizing a portion of the depth of super-carburization, removing a portion of the decarburized surface and then hardening the steel thus treated. It is claimed that the advantages of the very hard super-carburized steel are retained while the wearing surface of the steel is changed from a coarsely crystalline structure to a fine clear chill structure of the nature of tool steel which permits of tempering to the required degree of hardness while increasing the strength and wearing qualities of the outer surface and providing a surface which will not readily spall or crack when in use.

Heat Treated Gears in Machine Tools*

A Consideration of the Manufacturing Methods and the Conditions of Use from the Standpoint of the Material Manufacturer

BY J. HEBER PARKER†

In the earlier days of machine-tool construction, when carbon tool steel was used for cutting and relatively light work was the order of the day, cast-iron gears were used for transmitting power. With the advent of air-hardening tool steel and heavier work the use of mild steel gears became necessary, while to-day, with tools of modern high-speed steel, the use of heat-treated alloy steel gears is well nigh imperative.

Gears of this last class may be divided into two general groups—case-hardened gears, with a low-carbon soft center or core and a high-carbon hard exterior or case; and tempered gears which are of the same composition and hardness throughout. With your permission I will now briefly discuss the characteristics, heat-treatments and merits of these two groups, as viewed in the light of a fairly wide experience with gears used in motor-car construction.

Case-Hardened Gears

Case-hardening is the process of heating a low-carbon steel, packed in a box with carbonizing material, to such a temperature and for such a length of time that the carbon content of the surface of the steel will be increased without affecting the original carbon content of the core. The steel is then hardened, and the result should be a hard case and a soft, tough core.

Case-carbonized gears may be made from four general types of steel—straight-carbon, nickel, chrome-vanadium and chrome-nickel steels—and of each of these types several modifications will be found in the market. On the whole the steels containing chromium are to be preferred, for they are freer from the tendency to lamination shown in nickel-steel—especially 3½ per cent. nickel steel—and they also absorb carbon more easily, lessening thereby the length of time and expense of carbonizing. Before carbonizing, the carbon content of each type should be about 0.20 per cent., and never more than 0.25 per cent., to avoid brittleness in the teeth. The carbon in the case should be raised to about 0.90 per cent., which can readily be done by the proper selection of case-carbonizing material and by using the proper temperature for carbonizing.

The temperature for carbonizing in general should be about 1600 deg. to 1650 deg. F. for all the types of steel mentioned. Lower temperatures do not give sufficient depth of case unless the heating operation is much prolonged. On the other hand, higher temperatures result in a case of excessive carbon content and in a core of such large grain-size that it will not respond to the subsequent heat-treatment as readily as if a temperature of 1600 to 1650 deg. had been used.

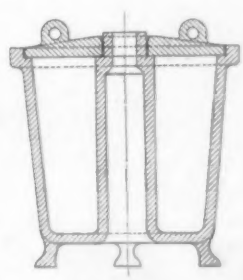
The heat-treatment after case-carbonizing is the most important part of the process, and upon it depend the physical properties of the finished piece. As already observed, after carbonizing we have a piece of steel with a 0.20 per cent. carbon core and a 0.90 per cent. carbon case, and the object of the treatment is to put both the core and the case into the best possible physical condition. Both core and case need refining to correct the large-grained structure developed by subjecting the steel for many hours to the carbonizing temperature. Since the refining or hardening temperature of the core is about 200 deg. F. above that of the case, this difference determines the most approved method of heat-treatment.

The old method of treatment consisted in quenching the piece in oil or water at the end of the carbonizing operation, right from the box, at the temperature used for carbonizing. This resulted in a large-grained core that was neither strong nor tough, and an overheated granular case which was hard, but which would not stand up in service any better than an overheated piece of tool steel.

The first improvement on this old method was to allow the piece to cool in the box after it was removed from the carbonizing furnace and then to reheat it to the proper temperature for hardening the case and quench in a suitable fluid. This procedure, however, did not develop a strong, tough core.

The proper heat-treatment for case-hardened gears is the so-called double treatment, by which the pieces are first allowed to cool in the box after carbonizing; next they are reheated to 1550 to 1625 deg. F. and quenched in a suitable medium to refine the core; then they are reheated to 1350 to 1425 deg. F. and again quenched in a suitable medium to harden the case; finally they are drawn in oil at not above 400 deg. F. to further increase the strength and toughness of the case-hardened gear. The temperatures given are approximate only; for exact information concerning any particular steel the user should consult the steel maker.

There are many case-carbonizing compounds on the market, and most of them have some merit. Those of bone are probably the least desirable, owing to lack of uniformity, which results in uneven carbonizing. The most desirable are those consisting of definite mixtures of carbon and carbonates; they carbonize uniformly, and most of them can be used repeatedly without losing their power of giving up carbon to the metal. As carbonizing is done in boxes, where volume determines the amount of carbonizer used, it is obvious that large bulk per unit weight is desirable.



A Cored Type of Case Hardening Box Which Effects a Reduction in the Expense of Case Hardening as Compared with a Solid Box

The wear and tear on carbonizing furnaces, the fuel consumed and the expense of the boxes are three important items in the cost of case-hardening. In many cases it is entirely possible to reduce all these items by the use of a cored instead of a solid box, as shown in the sketch. Proportions, of course, will vary with the work to be done, but if the general idea is worked out for each specific instance it will be found not only that the cost of carbonizing is diminished, but that more uniform carbonizing is accomplished.

Tempered Gears

Unlike case-hardened gears, tempered gears are of uniform carbon content throughout, and when hardened have a uniform hardness throughout the tooth section. The steels used for tempered gears are of three general types—silico-manganese, chrome-vanadium and chrome-nickel steel, the last named, in its several modifications, being by far the most used. The carbon content varies for the different types from 0.40 per cent. to 0.60 per cent. The heat-treatment of all these types is simplicity itself, consisting merely in heating the gear slowly and uniformly to the hardening temperature, which is usually about 1500 deg. F., and quenching in oil, after which it is drawn in an oil bath. The result is a strong, tough, dense-grained steel gear which has been used with marked success in motor-car work, and which is fast replacing soft steel and case-hardened gears in machine-tool construction.

Viewed from the standpoint of physical properties in the finished gear, the evolution in gear material from cast iron to tempered steel may be seen in the following figures:

Material	Elastic limit, lb. per sq. in.	Hardness sclero-scope	Toughness Guillery impact, kilogrammeter
Cast iron	20,000	25	Negligible
Soft steel	40,000	35	2
Case-hardened steel (average test of alloy steels)	120,000	85	2.5
Tempered steel (average test of alloy steels)	225,000	75	5

*Read before the National Machine Tool Builders' Association, New York, October 23, 1913.

†Metallurgist, Carpenter Steel Company, Reading, Pa.

For machine tools tempered alloy-steel gears appear preferable to case-hardened gears for a number of reasons.

1. Physically they are stronger and tougher and should therefore be better able to resist sudden impacts and extraordinary loads. Tempered gears do not show by file and scleroscope test the same degree of hardness as case-hardened gears, but nevertheless with proper design the dense-grained tempered gear tooth resists wear most satisfactorily, as was demonstrated recently by the examination of a motor-car transmission that had covered over 100,000 miles. The tempered gears in this car still showed the original tool marks. Not long ago a designer of machine-tools remarked upon the apparent softness of some tempered gears, but found after several months of hard service that they still showed their tool marks, thus proving the hardness ample for wear.

2. In service, especially for clash purposes, the superiority of tempered gears is most marked. On the clash faces case-hardened gears are liable to have the hard case chipped off, thereby exposing the soft core to the impact of clashing. The hard chips fall into the gearing and may find their way into bearings with resultant troubles. Tempered gears with a uniform hardness throughout do not chip, nor do they dub over.

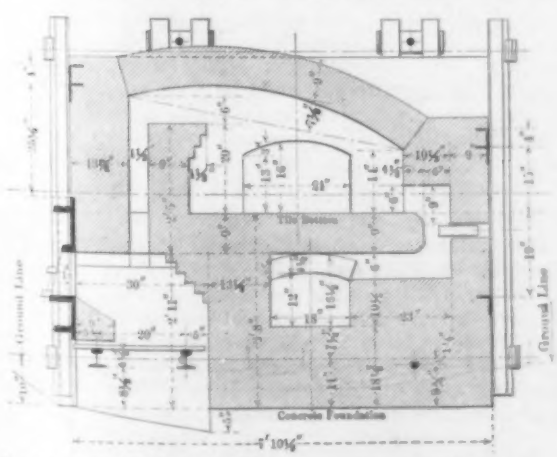
3. The heat-treatment of tempered gears is much simpler than that required for proper case-hardening. It is shorter, less costly and produces a more uniform product, and as the gear is heated but once for hardening as compared with three times for case-hardening, the finished gear is bound to be freer from warpage. The cost of proper case-hardening is not generally appreciated, but it has been found that a case-hardening steel must cost 3 to 4c. per lb. less than a tempering steel if finished gears made from both materials are to cost the same.

With all heat-treated gears little points in design are important. Gear teeth should not be undercut, for if the section at the root line is smaller than at the pitch line greater hardness and brittleness are produced where least desired. Great differences in section should be avoided wherever possible, so as to do away with excessive warpage. Sharp edges and sharp reentrant angles, even in keyways, are the cause of internal hardening strains which frequently result in failures; hence wherever possible a fillet should be used in place of a sharp angle.

Heat-Treating Equipment

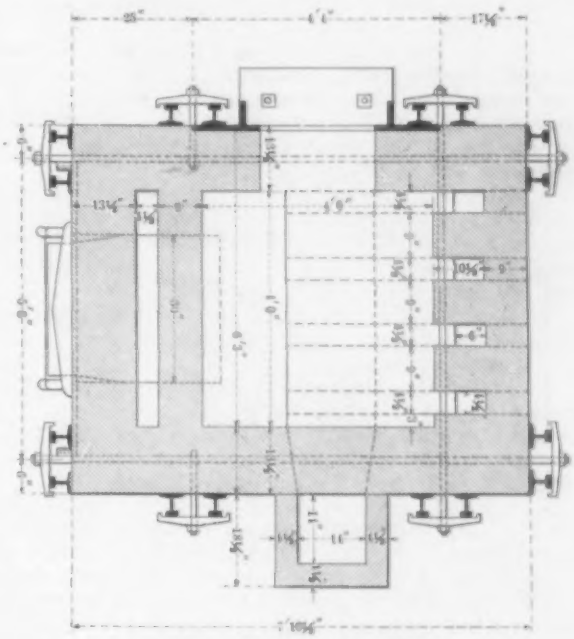
When heat-treated gears are suggested to the machine tool builder as a remedy for some of his troubles and as a means of eliminating a possibly large item for replacements and repairs, one of his first questions naturally is, of what does a heat-treating equipment consist? Usually the second question is, what will it cost?

The first item in equipment is a furnace. There are offered for sale a number of types of gas and oil-fired furnaces, and you are doubtless familiar with them. Few of you, however, are located in natural gas districts, and the price of fuel oil has almost driven the oil-fired furnace from economic use. Coal and coke, however, are available



Side Elevation of a New Heat Treating Furnace Using Coal and Coke as Fuel

everywhere, and I desire to submit for your attention a furnace fired with this kind of fuel. Anthracite, bituminous coal and coke work equally well. When bituminous coal is used the consumption with ordinary firing should not exceed 500 lb. in a 24-hr. day. The cost of this furnace depends somewhat upon the price of labor, but should



Plan View of a New Heat Treating Furnace

not exceed $300. The Carpenter Steel Company has been glas to accommodate a number of its friends by supplying them at cost with the necessary castings for a furnace of this type.

The next item is a suitable quenching medium. Running water with a suitable tank is always necessary in a hardening-room. To take the chill from the water in the winter or raise the temperature a little at any time, a jet of live steam in the incoming water pipe will be found very convenient. Heat-treatment of alloy gear steels, however, requires an oil bath, the size of which will depend entirely upon the amount of work to be quenched and the facilities for keeping the oil cool. The kind of oil best suited for oil-hardening was the subject of an investigation conducted by the laboratory of the Carpenter Steel Company, with the following results, comparison being made with water as a standard:

Kind of oil	Hardening quality
Water	1.0000
Mineral No. 1	0.2409
Mineral No. 10	0.2304
Corn	0.1927
Mineral No. 2	0.1607
Cotton seed	0.1606
Fish	0.1490
Rosin	0.1350

For hardening, several of the mineral oils are manifestly more effective than fish and cotton seed oils, which for a long time were looked upon as the best oils for this purpose. Mineral oil No. 1 has a specific gravity of 0.860, a flash-point of 420 deg. F., and a viscosity of 170 sec. at 100 deg. F., as shown by the Seybold viscosimeter. A mineral oil to this specification can be bought very cheaply. Oil can be cooled by blowing cold air through it or by pumping the oil through a coil of pipe immersed in cold running water, thus maintaining a circulatory system which admits cool oil at the bottom of the hardening tank and pumps the warm oil from the top through cooling coils back to the bottom. When air is used care should be taken to avoid an excess during the quenching of a piece, for if air instead of oil were to constantly strike the piece, uneven hardening might result.

The next equipment item is a drawing bath. This may consist of oil, lead, or a combination of salts, contained in a cast-iron or steel vessel. The container is usually a very simple design and may be fired by gas, oil or coal. The oil should be a mineral oil with a flash point of not less than 600 deg. F., this temperature usually being sufficient for all temper-drawing purposes. If higher temperatures are desired, a mixture of two parts potassium nitrate and three parts sodium nitrate may be

used which melts at 450 deg. F. and may be used up to 1000 deg. F., or lead which melts at 630 deg. F. To indicate the temperature of the bath a mercury thermometer should be used rather than a pyrometer, for most pyrometers will show considerable error at drawing temperatures under 800 deg. F.

The last item is a pyrometer. There are a number of good thermo-electric pyrometers on the market, and more depends upon the care taken of the instrument than upon the selection of any particular make. A few rules for the use of the pyrometer and a simple method of calibration will be interesting:

1. Keep the hot end of the thermo-couple as near the work as possible; do not put it through the furnace wall or roof, exposing the end to the direct heat of the flame, but place it so that it attains, as nearly as possible, the same temperature as the work.

2. Keep the cold end of the thermo-couple protected from the direct or radiating heat of the furnace—that is, keep it cool.

3. Protect the voltmeter by a dustproof case and place it on a support free from vibration.

4. All switches should be of the wiping-knife type. Improper contact at the switches is a prolific source of error, and such errors are not readily located.

5. Carefully check all thermo-couples as soon as they are received from the manufacturer and before putting them into service. Adhere closely to this rule, instead of assuming that new thermo-couples are sure to be correct; nor, for the same reason, should new thermo-couples be used in blind faith for checking, since they occasionally show a considerable error, and any one making use of them as standards will sooner or later come to grief.

6. Carefully standardize each pyrometer at definitely stated intervals—at least once a week, and as much oftener as possible. Frequent calibration is a matter not of convenience but of necessity.

The easiest and most convenient method of calibration of a pyrometer may be accomplished readily and accurately without the use of an extensive laboratory equipment is that based upon determining the melting-point of common table salt. Chemically pure salt, which is neither expensive nor difficult to procure, should be used where accuracy is desired. The salt is melted in a clean crucible of fireclay, iron or nickel, either in a furnace or over a forge fire, and then further heated until a temperature of about 875 to 900 deg. C. (1607 to 1652 deg. F.) is attained. It is essential that this crucible be clean, because a slight admixture of a foreign substance might noticeably lower or raise the melting-point. The thermo-couple to be calibrated is then removed from its protecting tube and its hot end is immersed in the salt bath. When this end has reached the temperature of the bath the crucible is removed from the source of heat and allowed to cool, and while cooling readings are taken every 10 sec. on the voltmeter. A curve is then plotted by using time and temperature as co-ordinates, and the temperature of the melting-point of salt, as indicated by this particular thermo-couple, is noted—at the point, namely, where the temperature of the bath remains temporarily constant while the salt is freezing. The length of time during which the temperature is stationary depends on the size of the bath and the rate of cooling, and is not a factor in the calibration. The true melting point of salt is 801 deg. C. (1474 deg. F.), and the needed correction for the instrument under observation can be readily applied.

The cost of this equipment, including a coal-fired furnace, five to seven barrels of hardening oil, one barrel of drawing oil, the tanks for holding these oils and a pyrometer should be about $500 to $600. The equipment just noted is the one necessary for tempered gears. When case-hardened gears are heat-treated there is necessary in addition to this case-carbonizing boxes and carbonizing compound, and depending upon the quantity of case-hardened gears to be treated a second furnace may be necessary. It is thus seen that for case-hardened gears the heat-treating equipment is more expensive than that required for tempered gears.

Heat-treated gears are bound to appeal to the progressive machine-tool builder. They will make possible the use of gears of smaller section, and while this may not be necessary from the standpoint of weight, as is the case with the motor-car builder, an economy of space is frequently desirable. Their greatest advantage is the elimination of repairs and replacements. In an interview with a machine-tool builder not long ago the fact was developed that about 15 per cent. of his productive capacity was taken up in the making of repairs and replacing parts. I am informed that this is a general condition and is one which is neither economic nor desirable, in view of the commercial alloy steels now on the market, the heat-treatment of which is extremely simple.

Industrial Uses of Coal Gas

Prof. William A. Bone, Imperial College of Science and Technology, London, England, discussed the possibilities of coal gas for industrial purposes at a congress held October 28 at the National Gas Exhibition. The main points of his address are as follows:

The Birmingham Aluminum Castings Company melted the whole of its aluminum alloys in 160 lb. charges in crucible furnaces, using high-pressure gas, and found as a result reduced melting costs, less loss of metal by oxidation and a greater tensile strength in the resultant alloy. Brass melting was also, he said, carried out with equally satisfactory results.

Some years ago the authorities at the mint decided to investigate the use of gas and oil in bullion melting, and ultimately in the early part of 1910 four gas-fired furnaces were installed for melting standard gold, fitted with special burners designed by S. N. Brayshaw, Manchester; from May 23 to December 31, 1910, 283¼ tons of standard gold were melted in them. The economies realized over the old coke-fuel furnaces were (1) a reduction of fuel costs from 14 to 9 cents per hundredweight of metal melted; (2) a 50 per cent. longer life of the crucible; and (3) the doubling of the melting capacity of each crucible without any alteration in the furnace dimensions. These satisfactory results with gold induced the authorities, in February, 1911, to install 16 gas-fired furnaces, each capable of taking a 400-lb. crucible, in the new silver melting house.

Gas-fired furnaces are now largely employed in Sheffield and Glasgow for hardening, tempering and annealing of special steels, including tool steels, and for file forging. The importance of accurate temperature control in such operations could hardly be exaggerated. Annealing furnaces used in Sheffield were, as a rule, 15 ft. 9 in. long by 2 ft. wide by 1 ft. high, and were capable of holding over 2 tons of bar steel each. He understood that over 40 such furnaces are now working in Sheffield, and that the cost of gas—reckoned at 25 cents per 1000 cu. ft.—was about $1 per ton of bars annealed at a temperature of 770 deg. C. Incidentally, the total time occupied by the whole sequence of operation—charging, heating, cooling and unloading—was only 48 hr. as against a minimum of 72 hr. for a coal-fired furnace.

By means of his surface combustion process it was possible to melt a ton of cold lead and tap it at a temperature of 372 deg. C. in a continuous apparatus using only 200 cu. ft. of gas, representing a thermodynamic efficiency of 80 per cent. As to future developments, he suggested that if high-pressure gas could be distributed at, say, 200 lb. per square inch pressure and reduced at the place of consumption, it would pay not only to distribute both high-grade and low-grade excess fuels, but also to mix them in suitable proportions for specific purposes.

The Steel Improvement Company, Windsor avenue and Cleveland & Pittsburgh Railroad, Cleveland, Ohio, has started to install probably the largest furnace ever placed in operation in a commercial heat-treating plant. Its size is 21 ft. x 9 ft. by 17 ft. 7 in. over all, with a hearth 20 ft. x 6 ft. by 3 ft. 6 in. from the spring of the arch. The structural work of this furnace is to be furnished by the American Shop Equipment Company, Chicago.

The National Iron & Steel Company, Houston, Texas, has sold 600 tons of rails and other track material to the Shreveport-Calcasieu Construction Company, Lake Charles, La., to be used on the Orange & Northeastern Railroad from Denton to Stark, La.

The United States Steel Corporation's Percentage of Production in 1912

The table below, which gives the percentage of the total production of iron ore, coke, pig iron and steel in the United States in 1912 that was turned out by the United States Steel Corporation, is taken from the Annual Statistical Report issued by the Bureau of Statistics of the American Iron and Steel Institute, 261 South Fourth street, Philadelphia, Pa.:

Iron ore shipments from Lake Superior and iron ore production in 1912; also coke production in the same year.	By U. S. Steel Corporation.	By independent companies.	Total shipments and production.	Percentage U. S. Steel Corporation.
Shipments of iron ore from the Lake Superior region in 1912.....gross tons.	24,331,837	23,889,709	48,221,546	50.46
Total production of iron ore in 1912.....gross tons.	26,428,449	28,721,698	55,150,147	47.92
Production of coke in 1912.....net tons.	16,719,387	27,264,212	43,983,599	38.01
Iron and steel actually produced in the calendar year 1912. Gross tons.	**Production U. S. Steel.**	**Production all others.**	**Total production.**	**Percentage U. S. Steel.**
Spiegeleisen and ferro-manganese.....	179,207	42,517	221,724	80.82
Bessemer, basic, low-phosphorus, foundry, forge, ferro-silicon, etc.....	14,006,957	15,498,256	29,505,213	47.47
Total pig iron, including spiegeleisen, ferro-manganese, ferro-silicon, etc.....	14,186,164	15,540,773	29,726,937	47.72
Bessemer, open-hearth, crucible, electric, and all other steel ingots and castings.....	16,901,223	14,350,080	31,251,303	54.08
Steel rails, including Bessemer, open-hearth, electric, rerolled, renewed, etc.....	1,872,772	1,455,143	3,327,915	56.27
Structural shapes.....	1,418,518	1,427,969	2,846,487	49.83
Plates and sheets, including black plates for tinning.....	2,959,050	2,916,024	5,875,080	50.37
Wire rods.....	1,676,916	976,637	2,653,553	63.20
Other finished rolled products, including nail plate, iron rails, merchant bars, rolled forging blooms and billets, semi-finished products rolled for export, etc....	4,037,530	5,916,276	9,953,806	40.56
Total of the rolled products enumerated above.....	11,964,792	12,692,049	24,656,841	48.52
Wire nails.....kegs of 100 pounds.	7,227,502	7,432,198	14,659,700	49.30
Tinplates and terne plates.....gross tons.	581,346	381,625	962,971	60.37

Meeting of Detroit Foundrymen

Annealing, Sand Blasting, Welding and Sand Handling Among Subjects Discussed

The November meeting of the Detroit Foundrymen's Association, held Thursday evening, November 13, reviewed impressions received at the recent Chicago convention. A. F. S. Blackwood, Michigan Steel Castings Company, analyzed the various exhibits that had to do with steel castings, beginning with the apparatus for cleaning castings and including the welding display. Regarding proper flooring for the cleaning room Mr. Blackwood stated that in their experience concrete floors had proved decidedly unsatisfactory and that he would recommend the creosoted wood block floor as a substitute. He called attention to electric trucks as a new element in transportation. With reference to tumbling mills he emphasized the necessity and eventual economy involved in having the mills built of amply heavy plate.

Concerning the annealing of castings, Mr. Blackwood related that at their foundry they annealed at 800 deg., getting the heat up in 3 hr., allowing the castings to soak for 2 hr., and drawing 12 hr. later. They use an over fired flame with waste gas drawn off at the bottom to the stack. He saw nothing at Chicago that would suggest a change in that schedule. The complete and elaborate display of sand blast machinery was also commented on, emphasis being placed on the necessity of having nozzles so located and the casting so handled in the sand blasting chamber as to insure the exposure of all surfaces of the castings. Some of the types of sand blast with fixed nozzles were pointed out as unsatisfactory for castings having small cores. Both low-pressure and high-pressure types of welding apparatus were mentioned, as was also electric welding. The importance of having the oxygen as pure as possible, where gas is used, was shown to be quite essential. A difference between 96 per cent. pure oxygen and oxygen 99.8 per cent. pure was shown to have been magnified enormously in the strength of the weld.

H. B. Swan, Cadillac Motor Car Company, and a member of the committee on papers for the next convention, reviewed the papers presented at Chicago. He noted the lack of attendance at the sessions and suggested a grouping of the subjects so that each session would be attended by those particularly interested, with the result that a concentration of both time and discussion would be secured.

Other topics included the question of "Sand and Sand Handling Devices," presented by H. M. Lane, and "Core Room Equipment" by T. A. Leyshan. Regarding the unloading of incoming sand for storage Mr. Lane expressed the opinion that as between an elevated trestle track with storage underneath to be filled from bottom dump cars and hand shoveling from the car on track at yard level into bins, it was a question of first cost and limited storage space against speed of unloading with the balance somewhat favorable under general conditions to the hand shoveling. In the discussion which followed relative times for unloading were cited. By hand shoveling 48 tons of molding sand was unloaded into a bin in 8 hr. and 40 min. With a traveling gantry crane and grab bucket 50 tons of silica sand was unloaded in 20 min. Mr. Lane pointed out that the problem of handling prepared sand was different than for raw sand. In the latter case the means of transportation was not important from the standpoint of deterioration of the sand. But for bonded sand, the carrying vessel must have a minimum area of exposure for the sand because of the evaporation of moisture. Prepared sand handled by means of drag or conveyor belts has been found to vary widely in its contained moisture until at the farthest points of delivery it has been unfit for service as the result of evaporation.

At an early meeting it is the intention to bring a number of bad castings and conduct an open discussion of the reasons for the defects in each case.

A report emanates from Salt Lake City that a syndicate of American and Canadian capitalists is formulating plans for the formation of a company to develop the iron-ore deposits of Utah and manufacture iron and steel products. It is stated that the scheme contemplates a company with $100,000,000 capital, to be known as the Pacific Steel Company. C. W. French, of San Diego, Cal., is mentioned among the projectors of the company, while others interested are J. Frank Watson, of New York; O. M. Johnson, of Pittsburgh, and J. F. Clark, of Fort Wayne, Ind.

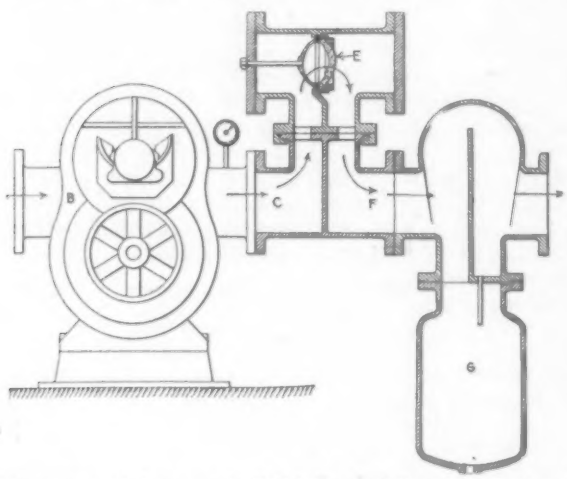
A New Process of Cleaning Producer Gas*

Precipitating Tar by Passage Through Glass Wool—Method in Commercial Use

BY H. F. SMITH†

In 1902 the writer instituted a series of investigations to determine the nature of the mechanical impurities present in producer gas from bituminous coal with a view to devising more effective methods for their removal. These investigations have since been continued and have resulted in the development of a commercial apparatus involving some new and interesting principles.

The tar and other mechanical impurities present in raw bituminous producer gas are in an extreme state of subdivision. The number of particles present is so great and the quantity of gas to be handled in commercial plants so large that the problem presents more than ordinary



Arrangement of Apparatus in Which Tar is Collected by Passing the Gas Through Glass Wool

difficulties. The effectiveness of the ordinary types of mechanical gas washers and purifiers leaves much to be desired. The primary object has accordingly been to produce equipment that will be capable of yielding gas of a higher degree of cleanness than obtainable by ordinary methods. The apparatus in its present stage of development can be readily understood from the accompanying drawing.

The raw producer gas on leaving the producer is first cooled to a point where the tar vapors are condensed by being passed through a primary cooler or condenser. From this the gas is carried into an ordinary rotary gas pump B which delivers the gas under pressure into the main C; it is then delivered through a porous diaphragm E and discharged from there into the main F. A sump or separator G is provided in which the tar accumulates.

The structure of the diaphragm E is a matter of considerable importance for the successful carrying out of this process and the materials used seem to have an important bearing on the operation of the equipment. The diaphragm must be sufficiently porous to permit the gas and tar to pass freely, otherwise it will soon become blocked with deposits from the gas and fail to operate. Many materials may be used for this purpose, but at present spun glass is preferred. The glass fibers are not only entirely unaltered by chemical action but seem to possess the necessary physical properties for the successful carrying on of this process. The spun glass in the form of ordinary glass wool (which should be carefully distinguished from slag wool, as the latter is not practicable for this purpose) is built into the form of a uniform diaphragm and is retained between two metal screens. The density of the diaphragm can be regulated by the quantity of glass used and by the degree of compression maintained between the metal screens. Ordinarily, this diaphragm is made up to a thickness of approximately ¼ in. The diameter of the diaphragm must be adjusted in accordance with the quantity of gas to be treated. Ordinarily, about 400 cu. ft. per hr. can be handled for each square inch of diaphragm area. No tar is retained in the diaphragm, both tar and gas being discharged together.

In passing the diaphragm an important change in the physical state of the tar occurs. On the entering side the tar exists in a large number of minute particles, ordinarily known as tar fog. In passing the diaphragm these particles are caused to coalesce so that on the discharge side the tar particles are of relatively large dimensions, so large in fact that they can no longer be carried forward in the gas current and immediately separate out by gravity. All that is necessary for the complete separation of the tar from the gas is to provide a sump, or drip, into which the precipitated tar can drain.

Pressure and Velocity Requirements

It appears to be possible to secure almost any desired degree of gas cleanness simply by regulating the pressure maintained across the diaphragm. In ordinary commercial operation, it is found that a difference in pressure of from 2½ to 4 lb. will give a degree of gas cleanness that is ample for any commercial requirement. Thirty cubic feet of gas cleaned in this way can be passed through a white filter paper without producing any discoloration.

The distinction between this process and the process of purification by filtration can be best shown by outlining the conditions essential for each process: *a* In filtration the best separation is secured when the rate at which the materials to be separated pass the filtering medium is slow. One of the substances to be separated remains in the filter. *b* In the process in question good results can be secured only when the velocity of the gas passing through the diaphragm is very high. Nothing whatever remains in the diaphragm.

At low velocities the gas will pass through the porous diaphragm used in this apparatus without any apparent alteration, and the degree of effectiveness of cleaning is directly related to the velocity of flow. For example, the degree of cleanness produced with the velocity of flow resulting from 5 lb. pressure is very much greater than the degree of cleanness produced by the velocity of flow resulting from 1 lb. pressure, and when the velocities are as low as those produced by a pressure of a few ounces only, there is no perceptible change in the tar content of the gas after passing through the diaphragm.

No water is used in connection with this process except that required to cool the gas. As a consequence there is no production of tar emulsion and the water flows from the condenser perfectly clear. The tar separated by this process is practically water free, and can accordingly be used for any purpose to which coal tar is adaptable. One sample of tar drawn directly from the receiver showed on distillation a water content of less than 1 per cent. as compared with from 20 to 60 per cent., which is ordinarily present in gas producer tar from mechanical washers. The calorific value of producer tar from Hocking coal is approximately 15,800 B.t.u. per lb., about 140,000 B.t.u. per gal.

For the maintenance of continuous operation the tar must be sufficiently fluid to pass through the porous diaphragm without creating undue resistance, and therefore it is necessary to maintain the temperature of the gas entering the diaphragm at a point that will reduce the viscosity of the tar to as low a point as is consistent with complete condensation of the tar vapors.

It is also apparent that this apparatus would not be well suited to use on gas containing large quantities of lamp black or for the purification of gas from coals yielding very heavy viscous tars. For high volatile coals, however, such as are found in Ohio, Indiana and Illinois, and for lignite, it has been found in practice to be thoroughly practical and effective. It is possible that further developments may extend the applicability of this method to conditions which are not now considered practical.

Theory of the Tar Separation

The exact method by which this tar extractor operates has not been conclusively demonstrated. Two theories have been advanced which may possibly cover the ground: The first and most obvious is that the tar particles are precipitated by being brought into direct collision with the threads or filaments of the porous diaphragm. That this does not constitute a complete explanation of the process is indicated by the fact that the material of which the

*Paper, substantially in full, printed in the November Journal of the American Society of Mechanical Engineers.

†Smith Gas Power Company, Lexington, Ohio.

porous diaphragm is constructed has a marked bearing on the effectiveness of the process and would indicate some action other than simple mechanical collision. For example, if the porous diaphragm is made up of steel wool instead of glass wool (the physical structure of the diaphragm being as nearly as possible the same in each case) the process does not operate with anything like the effectiveness secured with glass diaphragms. It would seem that the possibility for collision would be the same in both cases.

A phenomenon, first observed by the writer in 1902 during some experimental investigations, gives further credence to the theory that there is some action other than pure mechanical collision. If the gas is caused to pass through a small tube with perfectly smooth walls, as for example a tube of glass, no particular precipitation of tar occurs as long as the velocities of travel are slow. However, as the velocities increase to a point where there is considerable friction between the gas and the surface of the containing tube a heavy precipitation of tar occurs on the surface of the glass. This fact leads to the conclusion that friction is in some way concerned in this process, since the probability of mechanical collision is rather remote. Since friction between rapidly moving gases and enclosing tubes is known to be productive of electrical phenomena, it was assumed that this might possibly have some bearing on the action of this process. In fact this interpretation was the one first placed upon the phenomenon observed in 1902 and an effort was made to work out a tar extractor along this line.

An experimental apparatus was constructed at that time in which heavily charged electrodes were employed to precipitate the tar particles and it was found that fairly effective results could be secured. Experiments along this line continued for a number of years, but the difficulties in the way of producing commercially practical apparatus caused its final abandonment. The rate at which the tar particles could be moved through the gas under the influence of moderate potential gradients was very slow. It was accordingly necessary to use exceedingly high potentials in order to secure effective results. With the spacing of electrodes of approximately 1½ in. a potential difference of 25,000 to 35,000 volts was required for effective precipitation. On account of the difficulty of maintaining proper insulation under these potentials and on account of the great danger of serious injury to an unskilled operator in manipulating apparatus of this kind, this method was not considered practical. It was noted, however, that by decreasing the distance between the electrodes a very marked decrease in potential was observed. Accordingly another experiment was devised which will perhaps throw still further light on the method of operation of the process under consideration.

A series of electrodes was prepared with exceedingly small intervening spaces, and placed in connection with a source of direct electromotive force, the potential difference between the plates being much below that required to produce any ionizing discharge. It was found that at these small distances distinct cleaning effects could be obtained without ionization. Maintenance of the electric charge from external sources was troublesome owing to electrolytic short circuits occurring between the electrodes through deposits of tar and moisture from the gas. The fact, however, that there is a distinct attraction exerted by electrified plates at comparatively low potentials (which is sufficient to cause a precipitation of tar particles from gases) leads to the conclusion that if the distance between the electrodes could be reduced sufficiently the potential differences required for effective electrical action would be very small.

Commercial Equipments Now in Operation

Whatever may be the correct explanation of the phenomenon, its effectiveness and practical importance are beyond question. The first commercial equipment of this kind has now been in continuous operation for approximately 18 months. This outfit is handling gas for a producer gas power plant of approximately 1000 hp. capacity. The second commercial equipment is handling approximately 900 hp. producer gas, and has been in daily service for approximately ten months. The largest single installation is an equipment for cleaning 200,000 cu. ft. of gas per hour. This installation is operated in connection with a single producer unit which is of interest because it is one of the largest single unit plants ever installed in this country. This producer has an effective grate surface of 250 sq. ft. and is rated to gasify 3000 lb. of Illinois bituminous coal per hour.

Crisis in the German Cement Industry

Consul Talbot J. Albert, Brunswick, Germany, has furnished the following article to the Daily Consular and Trade Reports:

The administration of the Rhine-Westphalia cement syndicate (Verwaltung des Rheinisch-Westfälischen Cement-Syndikats) at Bochum has notified the cement factories and cement unions in Germany that, in consequence of the refusal of a number of works to prolong during the year 1914 the agreement regulating and fixing prices, the sales of cement will be free from limitation for the coming year. In order to reduce competition among themselves, 14 Westphalian cement works which belonged to the syndicate have formed a combination to be known as the Union of Westphalian Portland Cement Works. At the meeting of the syndicate held September 29, 1913, it is reported that the proposition to fix the maximum sale price at 150 marks ($35.70) per 10 tons was voted down, as also the motion to suspend sales until November 1, 1913. The statement at a meeting of the Holland Syndicate, September 30, 1913, that a number of Belgian cement factories, contrary to agreement, had made advance sales, has brought up the possibility that this syndicate also may find it necessary to dissolve.

The impending dissolution of the German syndicate has caused a rapid fall in the price of cement. The railroad administration at Hanover lately asked for proposals for the delivery of 17,000,000 kilos (16,731 tons) of Portland cement. Bids were received from 13 companies, varying between 13 and 16 cents per 100 lb.—half, or less than half, of the hitherto prevailing prices.

It is not impossible that the increased use of electrical power, which greatly augments the productive capacity of the factories, may have been a contributing factor in the present crisis.

The Trollhättan (Sweden) Electric Furnace

The experimental electric furnace for the smelting of iron ore at Trollhättan, which was built and for some time worked by the Järnkontoret, Stockholm, has on several occasions been referred to in our columns, says Engineering, London. The Järnkontoret worked it to October 1, 1912, when it was let to the Strömsnäs Iron Works. It has recently been transferred to the Trollhättan Electric Furnace Company, which appears to be affiliated to the Strömsnäs Iron Works. The original contract between the Järnkontoret and the Waterfalls Board having expired, a new agreement has been made, according to which the Waterfalls Board undertakes, for a period of 25 years from October 1 of the present year, to supply the new company with electric energy to the extent of 6000 hp. The company has also secured a lease, with option to buy, of an excellent site, formerly used by the Järnkontoret, and the latter institution has sold the furnace and all appurtenances to the company. The amount of energy contracted for is twice that used by the Järnkontoret for the furnace, and the new company will build an additional furnace of the same type. This fact, coupled with the move other big Swedish concerns are making in the same direction, points to the satisfactory results obtained by the electric smelting of iron ore.

Roebling Wire Rope at Panama.—An attractive bulletin has been issued by the John A. Roebling's Sons Company, Trenton, N. J., entitled "The Wire Rope at Panama." Much of this bulletin is made up of fine illustrations and text in the shape of advance sheets of an article that will appear in the "History of the Panama Canal, Its Construction and Builders." The special feature of the bulletin is data presented regarding the biggest rope produced by this company for the canal. It is a dredging rope 3¼ in. in diameter, and it has six strands of 37 wires each, twisted around an independent wire rope of six strands of 19 wires each, which in turn are twisted around a hemp center.

A Large Multiple Punching Machine

New Steel Car Fabricating Tool Having Two Rows of 30 Adjustable Punches

The Cleveland Punch & Shear Works Company, Cleveland, Ohio, has recently built an unusually large multiple punching machine for the Cambria Steel Company. It is intended to be used in steel car fabricating work, and is designed to punch no less than 60 holes 13/16 in. in diameter in steel plate as thick as 1½ in. The punches are arranged in two adjustable rows of 30 each, so that the fabrication can be carried on in the front, as well as in the rear. The machine is 17 ft. high, 17½ ft. long and 11 ft. wide, these being the over-all dimensions, and weighs approximately 186,000 lb.

As will be noticed from the accompanying engraving, the machine is massive. The housings, which have a clear space of 122 in. between them, are solid steel castings with removable close grained cast-iron bushings for all the bearings. The depth of the gap in each housing is 13 in. The plunger is a solid so-called semi-steel casting 30 in. wide, and is cross T slotted to take double adjustable steel bolster blocks. The guides of the plunger are oil grooved and polished and slide between the cover plates which are bolted to the housings by a double row of 1½-in. forged bolts. The end thrust is taken up by bronze taper gibs.

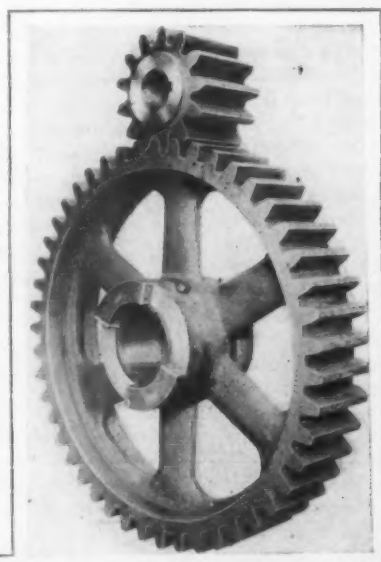
The lower girder is a solid semi-steel casting 30 in. wide, and like the plunger, is provided with T-slots in two directions to take the steel bolster blocks. The ends of this girder rest upon steps of the housings and are securely bolted in position in three directions by 2-in. forged through bolts with castellated nuts, 18 being employed. To take up the torsion when punching near the front of the girder, this member is securely tongued into the housings as is shown in the end view at the right of the accompanying engraving. The top girder is also a semi-steel casting, which is tongued and bolted to the housing by 12 forged through bolts 2 in. in diameter, having castellated nuts. Two intermediate camshaft supports are suspended from the girder, which also serves as a support for the air counterbalance cylinder and the motor bracket. The pitmans are close grained iron castings, bronze bushed to the main shaft. The thrust ends of the pitmans are convex, accurately finished and resting in close grained concave removable iron boxes.

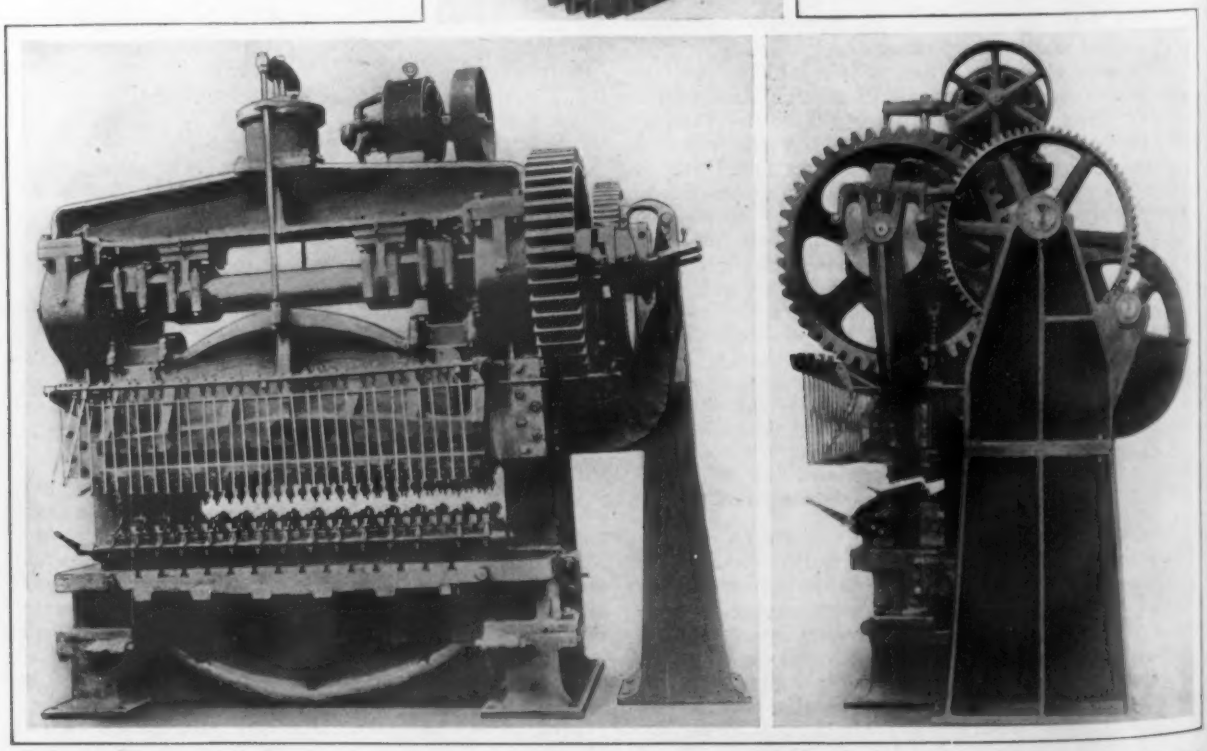
The outboard bracket is a semi-steel casting, tongued and bolted into the housings by eight 1½-in. bolts and rests on a pedestal extending to the foundation. This bracket is bored and fitted with bronze flanged bushings finished to the exact size by scraping. All of the driving gears are located between the outboard bracket and the right housing, an arrangement which enables short driving shafts to be used and provides a clear space between the housings. In this way it is possible for fabrication to be carried on in the rear as well as in the front of the machine, and the convenient handling of heavy material by a crane is also permitted.

All of the gears are of steel with cut teeth. The main gear is bronze bushed to its shaft, and the clutch has tool steel faced jaws, as is shown in the upper portion of the engraving. This gear is a steel casting with an outside diameter of 70 3/16 in. and a 14-in. face. The pinion, like the main gear, is a steel casting with facings of tool steel on the jaws. Its outside diameter is 21½ in. All of the shafts are of large diameter with ground and polished bearings, fitted with flanged bronze bushings.

To give an even lift an air cylinder having two rods is used as a counterbalance. The piston of this cylinder is fitted with eccentric rings and the cylinder is operated by two levers, which are adjustable across the front of the machine. These levers control the valve for throwing in or withdrawing the clutch, which is a steel casting with removable steel-faced jaws and an automatic release, there being no springs, shoes or weights tending to throw the clutch into mesh with the clutch gear, and thus eliminating the pounding sometimes found in non-automatic clutches. With this device the clutch is positive in operation and emphasis is laid upon the fact that the danger of a second stroke is entirely eliminated. The machine is belt driven from a 50-hp. direct-current motor, the belt running over the flywheel.

The equipment furnished with the machine includes two pairs of adjustable and reversible bolster blocks upon which are bolted the adjustable punch-





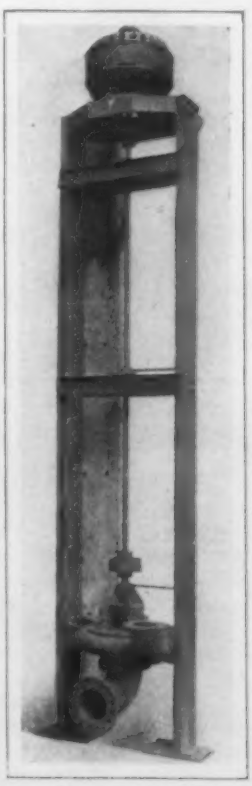
Front and End Views of an Exceptionally Large Multiple Punching Machine and the Main Gear and Pinion, Both of Which Have Tool Steel Faced Jaws

ing tools. Sixty gaged punching attachments, which are arranged in two rows and are adjustable from a minimum of 2½ in. to a maximum of 120 in., while the distance between the rows can be varied from 3 to 11½ in., are furnished. All of the punches are gagged and each gag has a disconnecting rod, so that the holes can be arranged in clusters and all the punches rendered inoperative, except the particular cluster desired. It is also possible to arrange taper rows if this is necessary. A peculiar and novel stripping arrangement is used, which permits the handling of the material from any side of the machine.

A Vertical Single-Suction Volute Pump

For lifting water, sewage and tank waste and for general industrial purposes, the Lea Equipment Company, Stenton and Wyoming avenues, Philadelphia, Pa., has placed on the market a single-suction vertical volute pump. These pumps, which can be used with either portable or stationary outfits, as may be desired, are built with discharge pipes ranging from 2 to 20 in. in diameter, and having a lifting capacity up to a maximum of 125 ft. The pump illustrated is the 8-in. size which is driven by a 40-hp. motor at a speed of 675 r.p.m. When operating against a 50-ft. head this pump is rated at 1600 gal. of water per min. The capacity of the smallest pump is approximately 50 gal. and that of the largest 10,500 gal. per min. Motor drive is employed, with the motor mounted in a self-contained frame built up of structural steel. This arrangement not only serves the purpose of a support, but is relied upon to keep the driving shaft in alignment. Another advantage of this construction is that the pump, the motor and the frame can be moved as a single piece from place to place.

The pumps are built with a solid housing that also carries the brackets by which they are fastened to the frame. The pump case consists of three parts, the housing proper to which the suction pipe is bolted, at the base, and the bracket carrying the shaft bearing at the top. The flanged discharge outlet is cast integral with the housing proper. The frame over the housing which supports the bearing carries the weight of the shaft and the impeller on a ball type thrust bearing, although this design is varied, according to the nature of the pit in which the pump works. Where the pump is to be used in a pit containing water the bearing is designed for use at the top of the frame and is supported by the cross framework on the uprights. A loose ring bolted on the top of the pump housing affords ready access for the inspection of the interior of the pump.



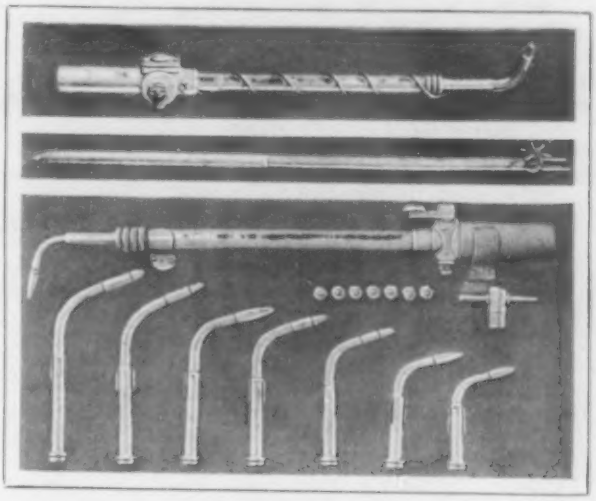
The New Lea Vertical Single-Suction Volute Pump Which Can Be Supplied in Both Portable and Stationary Units

The impellers are of the inclosed type and are made of cast bronze. Removable, grooved wearing rings fitted to the impellers make a close contact with the finished interior of the pump casing, this arrangement being relied upon to eliminate leakage. The driving shaft is kept in alignment between the sides of the frame by cross braces carrying steadying bearings, while the cast-iron motor base ties the frame together at the top.

The bearings are lubricated by sight feed devices, although an oil reservoir rotating with the shaft itself forces the return of the oil through pipes which lead to and cause a constant flow of oil over the bearing surfaces, the system being, in a measure, automatic. If the motor is arranged for operation with a controller of the float type, the pump requires little or no attention.

Welding Torch for Acetylene and Coal Gases

A welding torch adapted in various forms for different purposes is being manufactured by the Jahnke Welding & Supply Company, San Francisco, Cal. A feature of the torch is that either acetylene or coal gas can be used for welding.



A New Type of Welding and Cutting Torch Which Uses Either Acetylene or Coal Gas and the Different Styles of Interchangeable Nozzles and Tips Supplied

The torch is constructed on the injector principle and is so designed to prevent flashbacks without using a special flashback chamber. The nozzle tips are made of an alloy which is claimed to be capable of withstanding high temperatures, and also to remain free from molten metal which might otherwise stick to the tip.

In the accompanying illustration the torch at the top is a cutting torch equipped with a special aluminum valve, which enables the gases to be regulated with one hand. Directly underneath is a special water cooled welding torch, designed for reaching work through openings of limited size, the length of the torch being 40 in. The large size view at the bottom shows the company's standard welding torch, which weighs about 1½ lb., and the seven interchangeable nozzles and tips which can be supplied.

Workmen's Accidents Largely Falls

Under the title of "Falls of Workmen and Their Prevention," the Wisconsin Industrial Commission, Madison, Wis., has issued shop bulletin No. 4, reviewing accidents due to these causes. Nearly one-half as many accidents as occurred on all machines were due to falls of workmen. The bulletin covers the period from September 1, 1911, to March 1, 1913, or 18 months. Of the total number of accidents causing disability of more than seven days, 1387, or 13.2 per cent., were caused by the falls of workmen. The distribution is as follows:

Down stairs	52
From ladders	141
From scaffolds, tramways, trestles, runways, platforms	292
Down elevator shafts	28
Into vats, bins, holes, trapdoors, trenches, etc	105
From piles, poles, machines, boxes, etc	127
From buildings	45
From wagons, cars and other vehicles	204
Slipping, stumbling and jumping	393
Total	1,387

Most of these accidents were of a serious nature, 48 resulting in death, 425 in fractured bones, and 30 in serious internal injuries. In many cases, the bulletin says, these accidents might have been avoided by better shop lighting and proper application of safety appliances. Better organization, inspection, instruction of men, and more care on the part of workmen would have prevented most of the other accidents.

The Viking Shear Company, Erie, Pa., reports an improvement in foreign orders for metal shears. Recent orders have come from Manila, Japan, India and Central and South America.

Improved Pickling Machine for Sheets

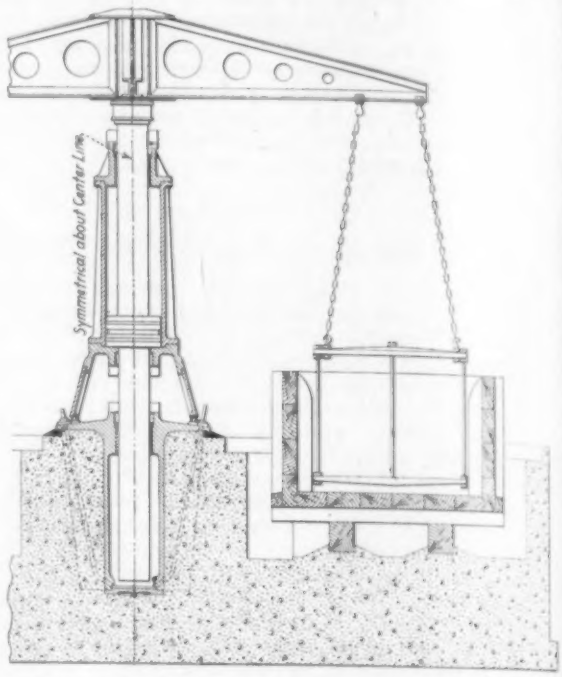
The Mesta Machine Company, Pittsburgh, Pa., has recently improved its standard type of pickling machine. The changes do not alter the external appearance of the machine to any considerable extent, but it is emphasized that the change in design has produced a greater economy in the steam consumption. In the original form the pickling machine had an overhead bearing fastened to some part of the building, generally a roof truss. This arrangement was relied upon to transmit to the building the bending action caused by the uneven loading of the radial arms, and as a result the machine frame could be made lighter and cheaper. The objection to this type of construction was that it was not possible for an overhead crane to pass, and any movement of the building due to temperature changes or settling was found to cause the overhead bearing and the steam cylinder with its piston to wear unduly.

As will be noticed from the accompanying illustration, the machine consists of a number of horizontal arms radiating from a central plunger and carrying suspended acid proof crates. Steam pressure lifts the plunger and it descends under the influence of gravity. When it is desired to raise the machine out of the pickling vats a lever is depressed, the parts then floating on steam in an elevated position and being readily turned to a new position. By moving the lever a second time the crates are lowered into the vats and the pickling process is resumed. In the older type of machine bolts were employed to secure it to the foundation. This construction was not altogether satisfactory, as the corroding action of the acid loosened the nuts of the foundation bolts, which had to be tightened from time to time to prevent vibration. The present construction of the machine is brought out in the accompanying line drawing. A downwardly projecting cylinder which is imbedded in concrete is used and foundation bolts are not considered necessary. There are a number of ribs radiating from this cylinder which increase the amount of surface presented to the concrete for adhesion. This cylinder construction is relied upon not only to give stability to the machine, but also to protect the lower part of the piston rod.

The consumption of steam has been reduced, it is explained, as follows: By filling the bottom cylinder and the interior of the piston rod with compressed air, most of the dead weight of the machine is balanced, so that a much smaller quantity of steam is required for lifting the loaded crates. As this air is not exhausted, but is retained in the cylinder, a small air compressor supplies the air lost by leakage.

In the operation of these machines the material to be cleaned is moved through the acid with a predetermined velocity and a slight jar. The latter is relied upon to separate the sheets, if that is the material being pickled, long enough to allow the acid to enter between all of them and to keep them from sticking to each other. The acid washing over all the surfaces has in conjunction with the loosened scale a scouring action which tends to clean the sheets thoroughly. Emphasis is also laid upon the fact that the acid is thoroughly agitated, to prevent the formation of acid layers of different densities.

A Recently Developed Low Type Pickling Machine



A Sectional Elevation Showing Method of Support and Balancing Cylinder

Hagan Furnaces

The George J. Hagan Company, furnace engineer, Pittsburgh, Pa., has issued for distribution an attractive catalogue of the Bailey combination sheet and pair furnace, for sheet and tin mill work, of which that company is sole licensee. This furnace was hand-fired when first put into service, but it was found that with such firing there was a lack of the proper control of temperature, even though the furnace was recognized as a decided fuel-saver. The George J. Hagan Company then equipped it with the American automatic underfeed stoker, and with this improvement the problem of temperature control was satisfactorily solved. So marked were the economic results obtained that general interest was aroused among users of such furnaces and a large number of orders were secured for the combination furnace as thus improved.

With this furnace, the off gases from the pair furnace pass into the sheet furnace, thence to the draft flues, thus dispensing with one firebox. It is stated that using the waste heat from the pair furnace for the sheet furnace effects a fuel saving of 40 per cent., as proved by trial tests. The Hagan Company has for inspection a large number of testimonials from users of the Bailey combination furnace showing their appreciation of the excellent results obtained.

The Hagan Company has also designed a number of other classes of furnaces of the stoker-fired type for various kinds of work from rivet heating to melting. In addition to the combination furnace above described, the company erects an independent furnace for sheet and tin mill work.

The Erie Clutch & Pulley Company, Erie, Pa., maker of portable hoists, friction clutches and pulleys, has purchased the plant formerly occupied by the Sims Company on Holland street and expects to be located in its new quarters by January 1. The plant will enable the company to largely increase its output.

Refractories in the Iron and Steel Industry*

The Classes of Materials for Lining Metallurgical and Other Furnaces and the Present Tendencies as Regards Kind and Quality

BY HARRY W. CROFT†

The word refractories is taken to mean the materials used to resist the action of heat, slags and gases continuously at work upon the lining of practically every furnace engaged in metallurgical operations. The briefest consideration shows their importance when we recall that the blast furnace and the hot blast stove are merely huge stacks of firebrick inclosed in steel shells. The open hearth is a structure of various refractories properly stayed. In such furnaces the refractories form the laboratories where heat, slags and gases may effect their transformations.

Three Classes of Refractories

In considering refractories we divide them into three classes, the quantities of each manufactured in 1912 according to the United States Government statistics being as follows:

Fire clay brick .....778 millions, or 83.8 per cent. of total
Silica brick .....136 millions, or 14.7 per cent. of total
Basic, or magnesite and chrome brick, 14 millions, or 1.5 per cent. of total

Fire clays are essentially silicates of alumina, varying widely in their proportions of silica and alumina and in the content of impurities, such as lime, iron, magnesia and alkalies. They are formed by the disintegration and decomposition of feldspathic rocks.

In a general way we divide all clays geologically into two classes, those that occur in the coal measures and those of other measures. We again separate coal measure clays into two classes: the flint vein, lying within the Pottsville Conglomerate series, and all the other clays occurring higher in the coal measures, known as Upper Vein Clays. The latter may be considered as solely plastic clay. So far the known deposits of the flint clay of this formation are restricted to limited areas in Pennsylvania, Maryland, Ohio and Kentucky.

Of the clays in other measures, scattered bodies of flint clay occur in Missouri, but the deposits differ from those in Pennsylvania. They occur in pockets or sink holes of limestone formations.

However, the majority of these clays are probably of the cretaceous period. Such cretaceous clays of New Jersey and practically all those of the Southern and Western States are as a whole less refractory than the best flint clays, but some of them have other virtues not possessed by the latter.

As the iron and steel industry requires a large percentage of high-grade fire brick, and since the majority of these brick are made of the coal measure flint and plastic clays, we will in discussing manufacture confine ourselves to these two clays. Various mixtures are used, ranging from about 90 per cent. of flint and 10 per cent. of plastic in the most refractory brick, to a brick of the least refractoriness, made entirely of the plastic clay.

Manufacturer of Fire Clay Brick

The clays mined and properly selected are broken into small lumps, mixed in suitable proportions and ground in the wet pan to the proper degree of fineness. The mass is then moulded into shape, tempered on a hot floor, repressed, thoroughly dried and burned at a temperature of 2600 to 2650 deg. F. This is the old hand-made process.

This brick is open, porous and well adapted to withstand sudden changes of temperature. Many departures from this process have been tried and various machines employed in the different stages of manufacture. In many cases there has been a speedy return to the hand-made process, while in others a better brick has been developed for certain uses.

In the high-grade brick, the most noticeable development in the machine-made product is in the manufacture of blast-furnace brick on a steam or other powerful press. The machine-made brick is denser by 7 to 8 per cent. than the hand-made one. Most cheaper grades of brick are made by machinery.

Uses of Fire Clay Brick

As to the uses and development of fire clay brick, we will consider definite examples, such as the blast furnace, open-hearth furnace, etc., the conditions to which the brick are subjected, and how far these materials answer reasonable demands.

IN THE BLAST FURNACE

For a blast furnace lining three kinds of brick are made: For the hearth and bosh a brick of maximum refractoriness and one capable of resisting the action of the fused or semi-fused furnace contents; for the inwall a brick to stand high heats and abrasion; and for the top a dense and tough brick to withstand the wear of the stock and resist the action of the gases.

The introduction of the water-cooled furnace, with its lining of 12 in. or less, necessitates the use of the highest grade of refractories available, and the blast furnace operator and brick manufacturer co-operated in making a brick of more uniform dimensions and of much greater density than heretofore, without sacrifice of refractoriness. This was accomplished by a mixture of clays giving the minimum of shrinkage and by manipulation designed to increase their bond to the maximum. The brick were finally made into 12-in. blocks on a steam press. The result was a lining that fulfilled the expectations of all concerned.

The furnace in which this lining was put was blown out after an eight months' run, to make some slight changes in the shell. The lining had taken on a thin coating of carbon which, when chipped off, exposed the face of the brick in many cases with the original skin intact. In making a 12-in. lining of such great density, backed by a water-cooled jacket, there was naturally some apprehension as to whether it would spall. An examination showed that no spalling occurred. It also resisted the abrasion of the stock and channeling blast, and was practically impermeable to gases. A number of these linings have since been installed.

Several years ago a committee appointed by one of our largest iron and steel interests made an exhaustive study of refractories to combine practical operating experience with the knowledge of the brickmaker in producing, if possible, better brick. The result of their study of blast-furnace linings led to a specification for blast furnace brick calling for a minimum of impurities and of consequently higher refractoriness than the standard linings. To produce this brick without loss of bond, the carefully drawn specification called for special treatment in almost every department of the manufacture. Two hand-made linings were made under this specification.

A few years previous to this development, at the request and with the co-operation of a well-known blast furnace manager in the Chicago district, several linings were made, with the object of producing a lining somewhat more refractory and at the same time denser and tougher than the standard linings. These were made in a manner very similar to those just mentioned, the principal difference being in less hand picking, rehandling and washing of clays, with a saving in cost. They also were hand made.

In summarizing the three developments cited it is of interest that each of the three efforts to improve the old standard lining approached the problem from a somewhat different angle.

The making of the steam-pressed linings for the thin-lined furnace aimed directly at a brick of *much greater*

*Paper read before the American Iron and Steel Institute, Chicago.

†President Harbison-Walker Refractories Company, Pittsburgh.

density and toughness, without sacrificing any refractoriness.

The second method undertook to *materially increase the refractoriness of the brick,* at the same time maintaining, if possible, the bond of the standard furnace brick.

The object of the third method was to *increase both the refractoriness and toughness* of the brick, in a lesser degree, possibly, than in the other two cases, but without materially increasing the cost.

All three are refinements of manufacture with varying degrees of additional cost. As a furnace often runs four or five years on one lining, the determination of the qualities in a new lining is naturally slow, requiring a series of runs to cover the varying conditions under which different furnaces are operated.

At present blast furnace men are calling for the hand-made and machine-made linings in about equal numbers. The present machine-made lining includes as many as possible of the good points of the first steam-pressed lining referred to, without all of the extra treatment of clays and consequent higher cost. In one point apparently the machine-made brick should be superior, and that is in furnace tops. It is also possible to make it of more regular and uniform dimensions than by the hand-made process, thus insuring better brick laying.

IN VARIOUS OTHER USES

In hot-blast stoves fire brick act merely as a thermal reservoir, yet are subject to widely varying temperatures, to enormous loads, and in many cases to the fluxing action of the flue dust in unwashed gases. Again we note a development in the use of brick of greater density and higher refractoriness, with a decided tendency to substitute a higher for a lower grade brick.

Another recent development is the use of silica brick in the flash walls and domes. This materially increased the life of the stoves where used. Although in blast furnace and stove piping and connections high temperatures are not involved, mere density in the brick is insufficient; toughness is requisite. In recent years a high-grade brick specially designed for this use has proved economical.

What we have said of stove brick applies to the checker brick used in open-hearth furnaces and soaking pits. Here again the tendency is unquestionably toward the use of a higher grade brick.

The practice in many heating and welding furnaces is particularly severe on brick, for we encounter here extremely high temperatures and often sudden variations in temperature. Limited as we are by the refractoriness of the clays at our disposal, any substantial betterment in results must come from improved furnace design, or the substitution of silica for clay brick.

A remarkable development in the use of firebrick for boiler settings has taken place in recent years. It was but a few years ago that the words boiler brick were synonymous with a second or third-grade material. To-day no fire-clay brick is considered too good if it materially lengthens the service. For the sidewalls many are finding a blast furnace brick economical, and even expensive bauxite brick is sometimes used because of its greater resistance to clinkering. Under modern conditions of increased grate areas, mechanical stokers and forced draft, any or all of which may be involved in the common practice of working boilers from 50 per cent. to 150 per cent. over rated capacity, the problem of the boiler, setting is no small one.

At first sight the gas producer has no real lining problem, yet to-day certain producer manufacturers have entirely discontinued the use of other than the highest grade of brick, and are experimenting with various linings, including bauxite brick.

Silica Brick

This brings us to the second division of our classification, namely, silica brick. The silica brick manufactured in Pennsylvania is made from a quartzite that occurs in the Medina and Oneida sandstone formation. While extensive, these measures carry good rock only in limited, but well-defined, areas, the most familiar being the Mt. Union and Hollidaysburg districts. The Baraboo quartzite of Wisconsin, from which brick are made in the Chicago district, is of an older formation and is also found in limited areas. The rock from which silica brick are made in Alabama has not yet been distinctly located geologically. The deposits are comparatively small and widely scattered. The Alabama and Pennsylvania rocks are of a grayish color, while the Wisconsin rock is of a reddish appearance. Their analyses vary but little.

In the manufacture of silica brick, care in the selection of rock is most important. At the quarry the rock is broken and at the works crushed into small pieces and ground to the proper fineness in the wet pan, 2 per cent. of lime usually being added for bond. The brick are manufactured in a manner similar to that used in making clay brick, but are burned at a higher temperature. We believe the silica brick of to-day are better than they were several years ago. The workmanship is better; the bricks are tougher, due to improved methods of making; and they are better annealed.

The high refractoriness of this brick, its slight expansion under heat, and exceptional conductivity have increased its use in the manufacture of iron and steel enormously. It would be rash to hazard a guess as to its future possibilities.

IN OPEN-HEARTH FURNACES

In the open hearth, whether basic or acid, its use is no longer restricted to the sidewalls, blocks and roof, but is extending to the checkers, roofs and walls of the regenerators. The marked increase in the life of the open-hearth roof in recent years is noteworthy. But a few years ago an average of 250 to 275 heats was considered fairly good. To-day an average of 400 to 500 heats is not uncommon, and single runs up to 800 to 900 heats are frequent. While by far the largest share of the credit for this marked change is unquestionably due to improved furnace design, methods of operation and better brick laying, we believe some credit is due the better silica brick being made to-day.

IN THE BY-PRODUCT COKE OVEN

In the by-product coke oven is seen the greatest development of recent years in the use of silica brick, displacing clay and quartzite brick completely above the oven floor and in certain portions beneath. It has developed surprising qualities in withstanding unavoidable changes in temperature and in meeting actual operating conditions. This use of silica brick is wholly an American development. A few years ago 24-hr. coke was normal; to-day by the use of silica, with its greater refractoriness and conductivity, it is possible to make 15-hr. coke.

In Eastern crucible practice silica has to-day displaced clay brick in fully 90 per cent. of the tonnage.

We have in heating furnaces one of the newer uses. It has in gas-fired pipe-welding furnaces proved a great economy and is adapted wherever there are no sudden changes of temperature. In the roof of large span and small rise the absence of shrinkage gives silica an advantage.

As a whole, there are in the boiler arch too rapidly varying temperatures to render its use satisfactory, but where the boilers are gas fired, and sufficient care is exercised to prevent sudden changes of temprature, the worth of silica brick has been demonstrated.

Basic, of Magnesite and Chrome Brick

There now remains the third division of our classification, namely, basic refractories. The introduction of the open-hearth process for making steel called for a refractory material for lining the bottoms and sides of furnaces that would resist the action of basic slag. The oxide of magnesium or magnesite, as it is called, was found best adapted for the purpose. Magnesite occurs in nature in two forms: the white or amorphous variety, and the crystalline form. In its natural state magnesite contains from 48 to 52 per cent. of carbonic acid gas, which must be driven off before the material is suitable for furnace work, and the difficulty of thoroughly calcining this white amorphous magnesite makes its use as a refractory impracticable. The crystalline form used by steelmakers is found in Austria, Hungary and Sweden. The crude magnesite is burned in shaft or rotary kilns, crushed, sorted and sacked, ready for furnace bottoms or to be made into brick.

An approximate analysis is as follows:

Magnesia	82 to 88 per cent.
Lime	3 to 4 per cent.
Silica	3 to 5 per cent.
Iron peroxide	5 to 7 per cent.

A magnesite of this composition will flux sufficiently in a furnace to make a hard vitreous bottom, or if burned into brick will have a strong bond.

The process of manufacturing magnesite brick differs but little from that employed in making other brick. The temperature of burning, however, is very high, approximating 3000 deg. F. The major portion of magnesite and magnesite brick used in the iron and steel industry is for the bottoms of basic open-hearth furnaces and in the sidewalls extending above the slag line. This material is also widely used in the ports and blocks, and many furnaces are now being constructed where the end walls and uptakes are built of it. The bottoms and sidewalls of electric furnaces of certain types are also of magnesite. Magnesite brick are being generally adopted in iron and steel furnaces wherever basic slag is encountered.

CHROME ORE

Chrome ore, or chromite, is coming into general use in steel making on account of its refractoriness and resistance to both acid and basic slags. It is a mineral that is practically neutral. It occurs widely distributed, being found in North America, Turkey, Greece, Japan, New Caledonia, Cuba and Africa.

In practice a chrome ore running from 40 to 50 per cent. chrome oxide and from 3 to 7 or 8 per cent. silica makes the best refractory. In the form of brick this material is used in open-hearth furnaces, soaking pits and dolomite kilns. It is also ground and used as a patching and daubing mixture for repairing jambs, sidewalls, ports and blocks of open-hearth furnaces. The process of making chrome brick is practically the same as in making magnesite brick.

Conclusions

In summarizing this review of the use and development of refractories there are certain points that will bear emphasis, even at the expense of repetition.

We note the frequent use of magnesia and chrome brick to resist basic slags, displacing a high-grade fireclay brick.

We see silica brick displacing clay brick where the maximum refractoriness is required and where the variations in temperatures permit.

We have a higher grade of fireclay brick displacing the lower.

In these, as well as other instances that might be cited, this tendency is apparent, namely, the gradual substitution of the higher-grade refractories for the lower. The number and variety of difficult shapes is fast increasing. Brickwork is laid with greater accuracy. Today less than half the clay or cement formerly used for laying is employed. As in other lines of manufacture, specifications are becoming more rigid. Firebrick manufacturers are now working under specifications that several years ago were considered impossible.

The brickmaker is somewhat limited in his efforts to develop his product by the fact that in the past 25 years no new beds of fireclay of a quality better than formerly used have been discovered. These clays all have their well defined limits of refractoriness. He is therefore to meet new conditions confined to a mixture of known clays in various proportions, with suitable additions of calcined clay; to grinds of various degrees of fineness; to burns of varying degrees of hardness; and to special treatment of the clays. After a careful hand selection, any effort to increase the refractoriness by a further elimination of even a small percentage of impurities involves much rehandling in their weathering and washing, which is costly.

The future development of refractories will be interesting. The uses of silica are fast increasing; the field for basic refractories is widening, and it is probable that further refinement in the making of fire brick will justify the cost. This development presents problems for the iron and steel manufacturer, as well as the brickmaker, and we venture the opinion that with their continued co-operation much can yet be accomplished toward meeting the constant demands of the iron and steel industry in their efforts to increase their output.

Discussion of the Paper

Conditions to Be Met in Blast Furnace Linings—Comparison of Machine and Hand Pressed Brick

BY AMBROSE N. DIEHL*

Mr. Croft in his most interesting paper has described in a very clear and concise manner the occurrence and uses of what we generally term refractories. He has brought out the fact that it is the refractory element which makes possible the handling of the intense heat reactions encountered. When the processes of reduction of oxides and the oxidation of metalloids were first unfolded the question of the receptacle in which this work could be performed became an analogous one, and from that time engineering has devoted itself to the development of an economical and efficient support for the built-up crucible wherein the various reactions are carried on.

Factors of Refractoriness

The ideal refractory material should possess the following qualities:

1. The prevention of heat losses through radiation.
2. Ability to withstand the heat impress on it without altering its chemical or physical relations.
3. To have sufficient hardness to prevent abrasion and yet not spall.
4. To have a low factor of expansion and contraction.
5. To be inert to chemical reactions taking place within its confines.

Up to the present time we have not found the material which will fill perfectly all these specifications. When one class of refractories will satisfy certain of the above qualities, it will fail in others, and we must therefore select for our various processes that material which possesses the most of the desired factors and gracefully overlook the qualities which are lacking. That we are doing this is shown by the selection of different proportions of clays for the various demands in blast furnace requirements, and the combination of silica roof and basic bottom with a neutral zone in open-hearth practice, etc. These examples show the careful selection of the material which will obtain the best ranking of the various entering factors in the required conditions to be fulfilled. This same line of reasoning is applied to all the operations requiring the use of refractory material. The refractories encountered in these processes are principally oxides, either alone or in combinations, and are primarily of a high fusion point.

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Blast Furnace Linings

In the blast furnace with its reducing atmosphere, abrasive material, corrosive slagging reactions and high temperatures, we find the material best suited, from our present knowledge, to be a brick made of clay, silicate of alumina, or a mixture of clays, having different properties so proportioned as to suit the nature of the conditions imposed in the different points of the furnace as follows:

TOP.—The top brick is generally a mixture of flint and plastic clay, in which the latter greatly predominates to give hardness and ability to withstand the continuous abrasion of the stock sliding off the bell. In modern practice numerous devices have been suggested and tried for the protection of the lining at this point in the furnace. Cast iron wearing rings of varied design have given the best results, so that at this particular point the difficulties have to a great extent been overcome.

HEARTH AND BOSH.—The hearth and bosh brick is a mixture of flint clay with only sufficient plastic clay to give it a bond. The proportion is such as to withstand the intense hearth and bosh temperatures and slagging actions in these respective regions. Bronze cooling plates and water cooled boshes have aided greatly in keeping the temperatures of the brick below their fusion and fluxing point and thereby have protected these portions, with the result that a hearth and bosh will generally last a million ton campaign.

INWALL.—The so called inwall, situated between the top and hearth and bosh, is often left to the mercy of the stack reactions, and it is in this portion of the furnace in modern practice that the most violently destructive chemical reactions take place. The temperature ranges from 1200 to 2500 deg. F., and the brick should therefore be both hard and refractory. A compromise mixture of clays

between the top and hearth and bosh proportion is used. It is also at this point that further investigation should be concentrated, as 90 per cent. of the blast furnaces are blown out because of failure at this point. In almost every furnace lining 30 to 35 ft. from the top the lining starts to cut back at an angle of 12 to 40 deg. with the vertical toward the shell and again starts to slope from the shell at an angle of 18 to 20 deg., approximately the original thickness at the bosh. The brickwork generally for about 10 ft. above the mantle is very little affected. It is in the inwall portion that the temperature is sufficient to affect the limestone calcination and free the CaO, with all its avidity for combination. Any localization of high heat at a point where calcined lime or alkalies are in contact with the brick may bring on incipient fusion or softening and greatly assist in the failure thereat. A case of irregular filling or unequal driving may cause the coarse material to deflect to one side and allow the easy passage of hot gases through the consequent course of least resistance and further this local heating. Varied slag constitution, light burdens and high air volumes are conducive to hot tops and high melting furnaces, and therefore consequent stack temperatures sufficient to cause a fluxing action in the inwall portion. In almost every case of blowing out, when material is found clinging to the sides of the stack, free lime is greatly in evidence; also as much as 40 per cent. of sodium and potassium oxides have been found in many cases and the brick surfaces are frequently vitrified. Abrasion is the other great factor, and as the tendency of the brick is to soften with heat, the abrasive action is so much more pronounced if the brick is further softened by fusion action. That the inwall becomes thicker again above the mantle on the average cut out lines is further evidence that the lime has become partly satisfied with the materials in the charge and is not so eager to attack the brickwork. It is at a point, therefore, about 20 to 25 ft. above the mantle which we may term the *point of maximum erosion*, as here the combination of heat, fluxing and abrasion is most destructive.

Thin Lined Furnaces

The above explanation will go a long way toward making clear the so-called cutting out of linings at a fixed point. Cooling plates have been inserted in the stack in a number of instances, some with good success, but others have not been so fortunate. Some of the installations have been cast-iron L plates, others bronze plates. They have been placed flush with the inside wall and back various distances. The most successful of these have been the ones having the plates 18 to 24 in. from the face, thereby allowing the furnace a certain latitude in forming its own lines. The thin lined water-cooled furnace performs the same cooling functions, i. e., keeps the brick sufficiently cool to retard chemical action and have them retain most of their original hardness to withstand abrasive and chemical action. That this is true is shown by a 13-in. thickness of brick wall which has stood in some of our thin lined furnaces for considerable periods without being affected. Most thin lined furnaces, however, fail very rapidly should a small defective spot be formed, due principally to the wall having little stability in itself, and therefore the bricks fall in slowly until a serious lining condition arises. Angle iron projections have been used to hold the brick in sections, which is a step in the right direction. In some of our latest furnaces using outside cooling the wall is made thick enough to withstand a small local failure without disturbing the brick above it. If the above deductions are correct, either a chemically inert material of hard and refractory nature with little heat expanding properties, or a further development of a proper water cooling system should put the durability of the inwall on a par with the top and bosh.

STOVES.—The requirements for stove practice should be such as to have the brick withstand pressure and be so ground as to absorb and release heat rapidly without spalling. The brick on the top of the checker work should be refractory, burned hard and be capable of withstanding high heat. They should also be burned at such a temperature as to assure all shrinkage being removed, as, if this is not done at the kiln it is a sure thing it will be done in the stove, with consequent twisting and warping.

Machine and Hand Pressed Brick

To proceed a little further with Mr. Croft's remarks on different methods of manufacture, there was formerly a prevalent opinion that hand pressing of brick was a necessity and that machine pressing turned out a product which was not so durable. This feeling is passing, as the brick made in machines have a better appearance and are truer to size, besides being equal if not exceeding the hand pressed ones in durability. A comparison of a hand pressed 9-in. brick with a 9-in. machine pressed one, made from the same material and manufactured in the same plant, is given below. The machine pressed brick was superior in shape and appearance. In examining the relative merits of machine pressed and hand pressed fire brick certain determinations and simple tests are exhibited. First quality 9-in. fire clay brick were taken as samples. As shown in the following tabulations the apparent specific gravities were compared; those for hand pressed brick were found to average 2.01 for five samples and for steam pressed brick 2.13 for five samples. Eight of these bricks were tested for spalling when chilled from high temperatures, but none showed any signs of chipping off either when air cooled, when suddenly immersed in water, or when sprayed. One specimen of each was tested for absorption of water, and it was found that each took up 4.12 per cent. of its volume or 6.02 per cent. by weight for the hand pressed and 5.76 per cent. for steam pressed. By these tests it appears that the steam pressed brick has a density 6 per cent. greater than the hand pressed brick and is just as capable of withstanding sudden changes in temperature.

Test on First Quality Brick, 9-in. Straights

Sample	Steam or hand pressed	Dimensions, cubic contents	Weight, ounces	Weight cu. in.	Specific gravity
1	Steam	4½ x 2¾ x 8 15/16 = 95.519 cu in.	120.0	1.25	2.15
3	Hand	4⅜ x 2 7/16 x 8 29/32 = 94.977 cu. in.	112.0	1.18	2.03
2	Steam	4½ x 2 7/16 x 8⅞ = 97.348 cu. in.	122.5	1.26	2.16
4	Hand	4⅜ x 2 7/16 x 8⅞ = 94.643 cu. in.	111.5	1.18	2.03
5	Steam	4 17/32 x 2¾ x 8 15/16 = 96.183 cu. in.	119.0	1.24	2.13
7	Hand	4⅜ x 2 11/32 x 8 15/16 = 91.619 cu. in.	107.0	1.16	1.99
6	Steam	4 17/32 x 2¾ x 8⅞ = 95.510 cu. in.	119.0	1.24	2.13
8	Hand	4 7/16 x 2 11/32 x 8 31/32 = 93.278 cu. in.	108.0	1.16	1.99
9	Hand	4 11/32 x 2 5/16 x 9 11/32 = 92.023 cu. in.	108.0	1.17	2.01
10	Steam	4 9/16 x 2 7/16 x 8 29/32 = 98.780 cu. in.	121.5	1.23	2.11

Average weight per cu. in.—Steam pressed brick.....1.24 oz.
Average weight per cu. in.—Hand pressed brick.....1.17 oz.
Average specific gravity—Steam pressed brick.....2.13 oz.
Average specific gravity—Hand pressed brick.....2.01 oz.

Samples 1 and 3, 12 min. in forge, one-half of brick heated to white heat and immersed in water.
Samples 2 and 4, 30 min. in forge, immersed in water.
Samples 5 and 7, 15 min. in forge, air-cooled.
Samples 6 and 8, 15 min. in forge, sprayed with water.
Samples 9 and 10, both soaked in water 48 hours.

From our experience in handling brick in sheds for stock and rehandling for use, reports show a breakage loss of 50 per cent. less in the steam pressed than in the hand pressed ones. This is also true regarding breakage in transit. Considerable money is thus saved to the consumer and the maker. For some purposes hand-made brick will always be preferable; irregular shapes, etc., necessitate hand labor. The cost of laying the machine made brick, due to its more perfect shape and less breakage in handling, will also be a great factor in its favor.

Relation of Refractories to Cost of Production

When refractories are looked at from a replacement standpoint we find what an important item we are dealing with. Refractory material is in most cases rightfully considered a renewal, as it is in this sense that the large refractory expense is incurred. There is very little scrap value accruing to this account. The depreciation and amortization period is very short when compared with buildings, machinery, etc. The average open hearth furnace will last five to six months and a blast furnace lining about four years. Our material expense for open hearth renewals during the first six months of the year 1913 amounted to approximately $150,000, of which 78.30 per cent. was expended for refractories. The cost of the ma-

terial used in the last six blast furnace linings approximated $175,000, of which 66.08 per cent. was expended for refractories. There is another greater expense incurred and that is the loss due to gradual inefficiency as the brickwork erodes and the decreased tonnage per unit during the times of renewal.

Conclusion

The problem of refractories is of equal if not more importance from a monetary standpoint than the economies accruing from increasing a few per cent. in steam efficiency or bettering the load factor several per cent. at large expenditures, and should not be overlooked when investigating betterments in practice conditions. It is thus shown, as Mr. Croft has indicated, that refractories do indeed play a most prominent part in the industry. From the consumers' end new materials and progressive practices result in ever-changing demands on the refractory materials; from the manufacturing end the proper material should be so proportioned to meet these ever-changing conditions arising from such progression. By concerted efforts and clear understanding by both parties of the exact conditions to be met there is no question but that the present assumed amortization period can be greatly extended with full benefit to all parties concerned.

Reactions in the Blast Furnace

Results of an Analysis of Operations in Twenty-eight Different German Plants

An important paper by Prof. W. Mathesius, of Charlottenburg, Germany, regarding investigations of blast-furnace practice appears in issues of Stahl und Eisen of September 4 and 11. A method is worked out for analyzing blast-furnace operations, and this method is applied to data obtained from 28 different plants. The results are plotted in special diagrams which show clearly the dependence of the important operating factors on each other, and enable valuable lessons to be drawn. The results of important experiments on the relative reducibility of ordinary iron ores, sintered material and briquettes are also given.

The Important Reactions

After a short discussion of the reactions taking place in the furnace all but four are rejected as unworthy of serious consideration. These four are:

1. The combustion of the carbon in the coke in the hearth by the oxygen of the blast, according to the equation

$$C + O = CO$$

2. The reducing action of carbon monoxide on the iron oxides of the ore taking place in the central part of the furnace

$$Fe_x O_y + y\,CO = xFe + y\,CO_2$$

3. A decomposition of carbon dioxide by the carbon in the coke, which can only take place at temperatures well above the Boudouard limit of stability, i. e., at least 900 deg. to 1000 deg. C. The carbon dioxide may come either from the charge or from reactions between carbon monoxide and ferric oxide.

$$CO_2 + C = 2\,CO$$

4. A catalytic dissociation of carbon monoxide in the upper part of furnace.

$$2\,CO = C + CO_2$$

This reaction also can only take place above the limits of stability. The temperature must be from 400 to 600 deg. C. Above 600 deg. the speed of the reaction is so slow that it is of no practical importance.

The first, second and fourth are useful, but the third is a harmful reaction. Professor Mathesius, however, considers that reactions 3 and 4 neutralize each other, so that reaction 4 can be left out of consideration altogether, while No. 3 must only be borne in mind under conditions where it is not completely neutralized. The separation of carbon according to reaction 4 may be harmful if it takes place to an abnormal degree, for it may seriously oppose the free and regular passage of the gases through the charge. The factors to be used as a basis for the mathematical discussion are then given in detail and equations worked out which, being theoretical, may be applied generally. No assumptions are made to fit any special local conditions. By means of these equations diagrams may be constructed which clearly show the relations between the total carbon consumed, the ratio by volume of CO_2 to CO in the waste gases, and the carbon of the coke consumed by harmful reactions (by dissociation of carbon dioxide near the throat and the reduction of ferric oxide in the hearth). Such a diagram is shown herewith for a furnace making basic iron of the following average composition:

	Per cent.
Total carbon	3.70
Manganese	1.734
Phosphorus	1.713
Silicon	0.41
Iron (by difference)	92.443
	100.00

The co-ordinates are the total carbon consumed and the carbon lost by harmful reactions. Taking the blast

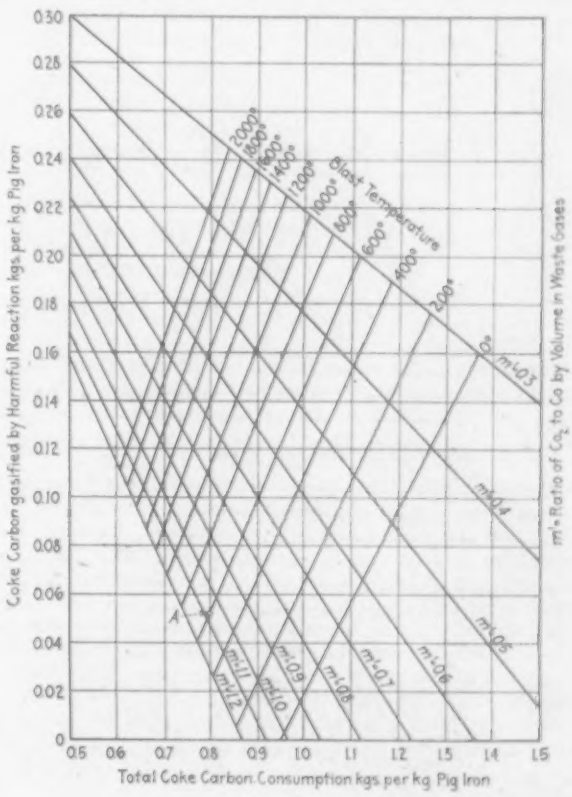

Diagram of Blast Furnace Operations

temperature as 600 deg. C. and calculating the heat balance for this particular furnace, the loss from cooling water and radiation was found to be 24.48 per cent. Assuming that this loss remains practically constant for various places in the diagram, the blast temperature may be inserted as an unknown in the heat balance equation and determined for varying values of carbon consumed and the CO_2 to CO ratio. These results are shown by lines drawn across the first ones.

What the Diagram Shows

The diagram shows among other things that, with a constant blast temperature, a constant loss of heat by radiation and water cooling, and the same output, the coke consumption depends entirely on the ratio of CO_2 to CO in the waste gases. It is the lowest when this ratio is highest. To cut down the loss of heat mentioned above, the furnace must be speeded up, but practical experience has shown that attempts to do this always lead to the production of white cold pig iron, due to well-known causes. The author then takes up in detail the favorable effect of replacing a large part of the friable ore used in the previous example by briquetted ore whereby the cooling losses are reduced to 13 per cent. This sets free available heat to counteract the harmful reactions and allows the choosing of more favorable operating conditions as is shown in the original paper by a second diagram, whereby the coke consumption is materially reduced.

Careful investigation was also made as to the actual heat losses in blast-furnace operation, data from 28 plants being used and the heat balances calculated. These results are also given in diagrammatic form for furnaces making spiegel, white iron and gray iron.

Effect of Charging Briquettes or Sintered Material

The latter part of the paper deals with the effect of using either briquettes or sintered material in the furnace charge instead of raw ore. Careful experiments were made by submitting samples of the ores, briquettes, sinter, etc., in pieces of nut size to the action of illuminating gas while being heated in an electric furnace. The results are shown again in diagrammatic form for 15 different materials. It was found that the iron oxides in the briquettes could be reduced entirely to metal, but in the sintered or agglomerated material the ferric oxide could be reduced, but not the ferrous oxide. In some cases the ferric oxide was only partially reduced to metal, the rest being changed to the ferrous condition. The briquetted material was also found to give better results than the lump ore, probably due to its more porous structure. The author draws the conclusion that briquetted material should be substituted for friable ores and those which are hard to reduce, whereby the furnace can be speeded up, the output increased, the heat losses reduced, and in general considerable saving in coke brought about.

Professor Simmersbach discussed the paper at length, disagreeing with some points, but he said that the author's conclusions had for years been found correct in actual practice. He spoke particularly in favor of the Schumacher briquettes, because in his opinion the coke they contained, from 10 to 25 per cent., was valuable in actual operation.

G. B. W.

The Steel Corporation Dissolution Suit

More Testimony in Favor of the Corporation—Competitors and Customers Go on Record Regarding Actual Competition

Hearings in the anti-trust suit against the United States Steel Corporation were resumed November 11, at 71 Broadway, New York, after a recess from October 31.

Vice-President Lippincott, of West Leechburg, Testifies

James Lippincott, vice-president and general manager of the West Leechburg Steel Company, West Leechburg, Pa., was the first witness. His company, he said, was organized in 1897 and has grown steadily since then, expanding most rapidly after 1902. It makes about 30,000 tons of steel billets yearly and purchases 15,000 tons in the open market. He mentioned among those from whom his company had bought billets on a competitive basis the Jones & Laughlin, New York State, Carnegie, Lackawanna, Republic and Cambria steel companies. He said the West Leechburg Steel Company never had been in any pool or price-regulating combination. It makes hoops and bands, which are sold in open and active competition with other makers.

Mr. Lippincott was asked by Judge Dickinson, attorney for the Government: "Have you not declined to give counsel for the Government any information that you might have in regard to the question in controversy in this case?"

"Yes, I declined," Mr. Lippincott replied, and added that the reason he refused to consult with the Government attorneys was because his sympathies were with the Steel Corporation.

John C. Jay, Jr., Tells of Open Price Societies

John C. Jay, Jr., Philadelphia, general manager of sales for the Pennsylvania and Maryland steel companies, described the products they manufacture. Since 1906, he said, there has been active competition between makers of steel products. The effect of the Gary dinners, said Mr. Jay, was not price fixing, but to prevent a price war and demoralization in the steel business. There was never any price fixing that he knew of.

The Pennsylvania and Maryland steel companies, Mr. Jay said, are now members of four organizations, known as "open price societies." They are the Bridge Builders' Society, Manganese Track Society, Manganese Steel Founders' Society and Steel Founders' Society of America. All these organizations are operative along the same lines. He said:

The whole idea of these societies is to have perfect frankness with regard to our prices, the way we find business, etc. Of course, we never fix prices, but limit our price announcements to the prices we have charged and do not mention the prices we expect to charge in the future.

One advantage of these meetings is that by means of them we can protect ourselves against dishonest buyers. Formerly when a buyer told one steel maker that he had received a low quotation from a competitor, the first steel maker, if he wanted the business, would have no means of telling whether or not this was a bona fide quotation. Now, by means of the society, he is able to find out what quotations have been made by his competitors and hence does not have to quote an unreasonably low price to meet a low fictitious price.

I am sorry to say that the Steel Corporation subsidiaries are not members of these societies.

I want to add that at the last meeting of one of the societies I was instrumental in having the doors thrown open to the trade paper reporters.

Asked if the open price societies stopped price cutting, he said: "No, we often cut prices after we have seen each other's bids."

Judge Dickinson, in cross-examination, brought out that Mr. Jay was also a member of a rail pool in 1905 and 1906. Although all the members were in New York he said that they went to Jersey City every day except Saturday. They would report each day the inquiries they had for rails, would report the freight rates and state the price they expected to quote. If anyone sold lower, the members of the pool would take it up and sometimes there would be very angry discussions over it.

These meetings, according to Mr. Jay, were always held under the advice of counsel, and the counsel subsequently advised a discontinuance of the meetings, after which no more were held. He said there is now great competition in the steel business, and that his companies had been in no pool or price-regulating combination since 1906.

Beneficent Influence of the Steel Corporation

On Wednesday C. C. Smith, president Union Steel Casting Company, Pittsburgh, testified that before the formation of the Steel Corporation business ethics in the steel trade were in bad shape; competitors had no confidence in each other, and the same condition existed between sellers and purchasing agents. He said those were very undesirable conditions under which to do business. During the past seven to ten years, however, "the influence and example of a large unit such as the United States Steel Corporation" have eliminated all of those misunderstandings.

"We still have competition," Mr. Smith stated, "but our competitors don't misrepresent to one another as they formerly did. We are honestly friends now; before we pretended to be, but in reality were bitterest enemies." The entrance of the corporation into the industry gradually brought about the elimination of bad practices, and instead there have come "manly and straightforward deals," almost "implicit confidence" among competitors and a more general desire to interchange advice as to remedies for defects in productive processes. Competitors now visit each other's plants, he said, and exchange advice where they found defects in their products, which was impossible 15 years ago, when they used to get into each other's plants by clandestine methods.

Taking up the moral uplift influences credited by the witness to the Steel Corporation, Judge Dickinson asked Mr. Smith at what period he and his competitors had

"tapered off from their lying practices." The witness declared himself embarrassed by the use of the word "lying," preferring to assert that his competitors "misrepresented," but replied it was some time in 1902 when the "reformation" began, but after 1906 there was definite confidence prevailing among competitors.

Several Witnesses Testify Regarding Competition

Louis McKinney, president Titusville Steel Company, gave evidence to show that there was competition in the steel business. Judge Dickinson asked:

"Have you not declined to give counsel for the Government any information that you might have in regard to the question in controversy in the case?"

"I said that I preferred not to," answered the witness.

"That was a refusal," Judge Dickinson said.

"I was not pressed to say anything further," Mr. McKinney replied.

John S. Haines, assistant to the vice-president of the Jones & Laughlin Steel Company, testified that there had been keen competition since 1904.

Robert Garland, president Garland Nut & Rivet Company, Pittsburgh, testified that his company uses wire rods and steel bars to the amount of 5000 tons annually. The purchases of this material, he said, were made, in the majority of cases, from the Jones & Laughlin Steel Company and the American Steel & Wire Company.

Frederick Beegle, president Union Drawn Steel Company, Beaver Falls, Pa., testified that his purchases of steel bars and rods amount to approximately 100,000 tons annually. Purchases, he said, were made on a competitive basis.

Railway Steel Spring Company Tells How It Buys

On Thursday Harry Inman, purchasing agent for the Railway Steel Spring Company, with offices in New York City, testified that he had never found any lack of competition in the steel trade. He told of contracts made with various steel companies for bars, billets, etc. He said that during 1907 and 1908 and half of 1910 and 1911 his company bought nothing practically from the Carnegie Steel Company, but in other years bought as high as 60 per cent. of the billet requirements. He said that this was due to the fact that the Carnegie Company could furnish a special billet containing carbon higher than ordinary.

Mr. Inman mentioned one contract with the Carnegie Company for 10,000 tons of billets at $20 a ton, made in 1911, when ordinary prices on billets were supposed to be higher. He said, however, that he approached several other steel companies, who refused the contract which the Carnegie Company afterward took. He said that the Railway Steel Spring Company always has lived up to its contracts, although, as a general thing, in the steel business, contracts are not considered binding.

A Point Made as to Interlocking Directorates

Joseph F. Guffey, general manager of the Philadelphia Company, Pittsburgh, stated that his company, which controls traction lines, natural gas and electric systems and other public utilities in and around Pittsburgh, is a large buyer of steel pipe and other steel products. Its purchases of pipe some years run up to 25,000 tons and are always made by contract. The custom of the company is to send out inquiries and then to award the contract to whichever manufacturer submits the best terms as to price and delivery. He testified that there always has been active competition among pipe and tube makers for the business of his company. Although Judge James H. Reed, president of the Philadelphia Company, is a director of the Steel Corporation and chairman of the board of the Carnegie Steel Company, he has never made any attempt to swing the business of the Philadelphia Company to the subsidiaries of the Steel Corporation. The only way such subsidiaries can get orders from the Philadelphia Company, Mr. Guffey said, is by submitting better terms than other steel makers. He submitted a list showing the tonnages of tubular goods purchased by his company each year, and showing also by which companies these goods were furnished, and what prices were paid.

C. H. Todd, president Petroleum Iron Works Company, Sharon, Pa., testified that he purchases about 25,000 tons of steel plates and structural material annually. All of this is bought at the lowest price obtainable, after competitive bids have been received from the steel makers. He said that there is active competition between the various plate mills and structural mills and that prices as quoted by the various mills always vary to some extent.

Edward L. Parker, general manager of the Columbia Steel & Shafting Company, Pittsburgh, said his company buys from 25,000 to 50,000 tons of steel bars a year, at the lowest prices obtainable after receiving competitive bids from the various bar manufacturers. He also testified that there is active competition in the sale of steel shafting. He said that his company makes from two to three times as much steel shafting as the American Steel & Wire Company.

A Large Hardware Jobber's Experience

On Monday, November 17, William D. Taylor, president of the National Hardware Association, composed of jobbers, and also president of the George Worthington Company, Cleveland, Ohio, one of the largest hardware jobbing houses in the Middle West, testified that he accepted as market prices the prices for nails and other wire products and sheets as announced by the American Steel & Wire Company and the American Sheet & Tin Plate Company respectively, two subsidiaries of the Steel Corporation.

As a general rule, Mr. Taylor said, the first quotations on nails and sheets which his company received in response to solicited bids on contracts and lots, were substantially the same, but after these were received his buyers began shopping or bargaining and by this means were usually able to buy below the market price or first quotations. He admitted that the hardware jobbers in his region are "kept pretty much together" on nail prices. This condition has been prevalent for a period of ten years. His buyers, however, Mr. Worthington declared, have secured lower prices by bargaining and also because of the large quantities purchased at one time.

On cross-examination Mr. Worthington admitted that from 1901 to 1906 his company had purchased about 60 per cent. of its nail requirements from the American Steel & Wire Company. All purchases, however, he insisted, were made on a competitive basis. On redirect examination by counsel for the defense he declared that the smaller nail and wire manufacturers always waited until the larger manufacturers announced their prices and generally followed their lead. Then the bargaining began.

Charles F. Tuttle, factory manager of the Tuttle & Bailey Mfg. Company, Brooklyn, N. Y., testified to the general effect that he always found competition in the trade and that steel prices were more variant than copper and other metals.

Allen M. Foster, vice-president Foster Bolt & Nut Mfg. Company, Cleveland, Ohio, said that he buys about 70 per cent. of his supplies from the American Steel & Wire Company because he gets better service and better products.

Denounce the Steel Corporation Suit

At Wheeling, West Virginia, November 12, 4000 representative citizens—bankers, business men, professional men and iron and steel workers—at a mass meeting, called on the petition of 700 citizens, adopted resolutions of protest against the proposed dissolution of the United States Steel Corporation. A committee was appointed to carry the protest to the Department of Justice in Washington.

W. B. Irvine, president of the Board of Trade, presided, and addresses were made by business men and by skilled workers employed in local mills of the Steel Corporation. The resolutions adopted commend the Steel Corporation for favoring workmen's compensation and old age pensions, for installing safety devices, and for otherwise bettering the condition of workmen.

No Steel Suit Compromise

The United States Steel Corporation officially denies the report from Washington that Richard V. Lindabury, one of its attorneys, had consulted with the Department of Justice in an effort to compromise the suit of the Government against the corporation. Mr. Lindabury admitted that he had been in conference with an official of the department, but that it was on another case altogether.

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Why Is Scrap So Low?

In the past few weeks the scrap trade has been asking itself the question, "Why is scrap so low?" Of course this is a question which has come up at intervals for years, indeed every time the iron and steel scrap market reaches a low point, but at the present time the question is raised with special interest, for scrap is unusually low, relative to other iron and steel commodities. No extensive comparisons are required to show this fact. The general decline in iron and steel commodities in the past few months has brought basic pig iron to a very low point relative to finished iron and steel, yet heavy melting steel scrap delivered in the Pittsburgh district is about $2 a ton below basic pig iron at Valley furnaces, whereas the two commodities have usually been not far from a parity. There are some grades of scrap which have suffered more than melting steel, while pig iron is relatively lower than finished material, hence it is obvious that scrap as a whole is particularly low relative to iron and steel as a whole.

Without going into details, it is desirable to mention at this point that comparisons over a period of years show one law conclusively: when prices are particularly high, scrap lags well behind pig iron, but when prices are unusually low scrap is above pig iron. Hence, when prices are low, as at present, one would expect scrap to make a particularly favorable comparison with pig iron, and the fact that it does not makes it the more evident that something is out of joint.

A partial explanation of the cheapness of scrap at the moment is the fact that industry is slowing down. This is always the case at such a juncture, while, when the mills are limbering up and increasing production, scrap makes a particularly favorable showing. This is entirely natural. A great deal of the iron and steel scrap of commerce is new scrap, produced in manufacturing operations, and when the production of steel ingots decreases the demand for scrap decreases, whereas scrap continues to come out for a time from the shops which work up the product of the steel mill. On the other hand, when the production of ingots is increasing, the demand for scrap increases first, and later comes a great out-turn of scrap from the manufacturing establishments.

A more general explanation which receives favor at this time is that the trade is beginning to feel the great increase in the production of steel that occurred some time ago. The theory is that if the average life of steel in its first employment is a stated number of years, then the outcome of scrap at any given time is in relation to the production the stated number of years back. The only difficulty is to determine the average life of material—the time elapsing until the material comes back as scrap. In the trade the period 15 years is most commonly assigned, though probably largely at a venture.

In the study of the question it is necessary to cite the statistics of production in the past, so as to observe the rate of increase in production and consumption of the primary material. Below is given a table of the total production of rolled iron and steel at five-year intervals, with the percentage of gain each year over the year five years earlier. This year's production is estimated, and that stated for 1908 is conventional, being the average of 1907 and 1909, since 1908 was an "off" year and its production of 11,828,193 tons would be altogether misleading in a comparison like this.

	Rolled iron and steel production. Gross tons	Gain over year five years earlier. Per cent.
1878	2,570,000	..
1883	4,520,000	76
1888	4,617,349	4
1893	4,975,685	8
1898	8,513,370	71
1903	13,207,697	55
1908	19,754,756*	50
1913	26,000,000†	32

*Conventional—average of 1907 and 1909.
†Estimated.

We see at once that 30 years ago there had been a great increase in production, but no one will maintain that it requires an average of 30 years for material to come back. Twenty-five years ago and 20 years ago there were negligible increases; production and consumption were practically stationary. Fifteen years ago there was a very great increase, being 71 per cent. over a year only five years earlier, and each succeeding period has shown a smaller increase. Assuming that the 15-year period so often mentioned in the trade as the time in which material should come back is the correct estimate, then during the past five years we have been getting material which was made fifteen years earlier, and during that period there was an increase of 71 per cent. in the production of primary material, whereas during these past five years our new production, which consumes the scrap coming out, has increased only 32 per cent. Here is a strong statistical suggestion that there is something in the 15-year theory.

However much one may trust to the theory just considered, it will be admitted that there are probably many other influences affecting the relation of scrap demand to scrap supply. As to the demand for scrap for the open-hearth steel furnace, it is well recognized that the steel maker who has his own blast furnaces calls for less scrap from the market than the one who does not have a blast furnace. In the first place, he usually makes a profit in the blast furnace, so that the scrap which must be bought in the market does not compete with the market price of pig iron but with the steel maker's cost of producing his pig iron. In the second place, if the steel maker has a blast furnace he generally uses direct furnace metal, and scrap is less advantageous, as to shortening the time required to make a heat than when cold pig is charged. Now it is an absolute fact that the proportion of steel made by interests having their own blast furnaces has greatly increased in recent years. The big companies buy less merchant pig iron than formerly and several steel works have bought or built blast furnaces. This change has operated to decrease the demand for scrap relative to the total production of open-hearth steel. In addition to this influence there is the much greater vogue of the duplex process, which is now extensively practiced by several large steel interests in the North, making a great increase in the production of duplex steel.

In the past 10 or 15 years predictions of increased scrap requirements by the steel industry have been based largely upon observations that the Bessemer steel industry has been decadent relative to the basic open hearth, and as the Bessemer departments make new scrap which can be used in the open hearth this is an important point. In the past half dozen years, however, Bessemer steel, while losing ground relatively, has not been doing so as rapidly as in earlier years.

It requires some analysis to indicate that the scrap requirements of the steel industry are probably not increasing as rapidly as the total production. As to the wrought-iron industry, no analysis is necessary, it being requisite merely to cite the statistics of production of rolled iron, which show that a maximum was reached in 1906, when 2,200,086 gross tons was made, last year's production being only three-fourths as great. It is quite possible, furthermore, that a larger percentage of the present wrought-iron production is made from virgin pig iron, rather than scrap, than was the case half a dozen years ago.

That iron and steel scrap will always command a price goes without saying. It is merely in competition with other materials. Whether the price will justify its being gathered and shipped depends upon the particular commodity, but it is a fact that scrap is gathered and shipped upon remarkably small margins. Some of the steel turnings recently sold in Pittsburgh at not over $6.50 per gross ton were shipped from Detroit, having been gathered there by wagons visiting different machine shops, while the shops had been to the direct expense of separating the steel turnings from other material produced by their tools. Neither the makers nor the dealers could have realized much on such business.

Industrial Peace Broken in New Zealand

Much has been written regarding the labor utopia in New Zealand. It is a country in which ideal conditions had been supposedly brought about in the relations between employers and workingmen. Probably in no other country have labor unions secured such a strong hold on the government as in that isolated community. They early succeeded in placing on the statute books stringent laws governing the settlement of labor disputes. After much controversy with employers, an act was passed eleven years ago providing for compulsory arbitration and conciliation, and this act has since been frequently alluded to as having proved effective in the prevention of strikes and lockouts. For a long while following its passage New Zealand was known as a land without strikes. It was the only country in the civilized world of which that could be said.

Recent news dispatches from that country report a completely changed condition of affairs. The unions have grown so confident of their power that they have refused to accept decisions made in some of the recent labor controversies, and this has brought about a bitter struggle between employers and the federated unions. A general strike has been in progress for some time, and it has resulted in privations for the poorer classes, caused by the shortage of food and fuel.

New Zealand is one of the countries that are to be covered by a commission appointed by the National Association of Manufacturers to study the relations of employers and employees, and which will start on its work next February. The peculiar conditions existing in New Zealand have made that country especially prominent among those to be brought under investigation. If conditions had continued as they were until recently, lessons might have been drawn from its experience which would be useful in the endeavor to ascertain what measures could be adopted in this country for the purpose of ameliorating or preventing industrial disputes. The breakdown in the New Zealand system, however, indicates that a permanent method of eliminating strikes has not yet been devised.

An Unbalanced Cabinet Officer

All real friends of labor must deplore the position taken by Secretary of Labor Wilson at the convention of the American Federation of Labor held at Seattle last week. The address which he delivered on that occasion was not of the character to be expected from a man chosen as one of the close advisers of President Wilson. The department over which he has been placed is one created by Congress for the purpose of endeavoring to bring about better conditions between employers and employed. Under its control are agencies for the promotion of conciliation. A man at the head of such a department, therefore, if he does not actually possess the judicial temperament, should free himself from bias as far as possible toward either capital or labor. We have often had examples of men of strong partisan feeling who, after having been placed in positions of responsibility, succeeded in divesting themselves of the partisan spirit, recognizing that in an official position they were called upon to care for the interests of all the people and of no particular class. It is to be regretted that Secretary of Labor Wilson has shown himself not sufficiently broad-minded for the high station he occupies.

A Destructive Lake Storm

This year will be memorable for great disasters. The list of destructive occurrences has been swollen in point of lives lost and property obliterated by the terrific storm which raged in the region of the Great Lakes from November 7 to 10. The worst feature of that storm was the gale which swept the Lakes on Sunday, November 9, and which centered largely on Lake Huron. The extent of the disaster to shipping was not known for several days, but it is now definitely established that not less than ten good sized vessels foundered on Lake Huron and six or more on other of the Great Lakes. The vessels lost included some of the largest ore carriers on the Lakes, and so recently built as to represent almost the last word in steel vessel construction. The number of lives lost was about 300. The storm was the most severe that has been experienced since the Lakes have been navigated commercially.

Complete 1912 Iron and Steel Statistics

The Bureau of Statistics of the American Iron and Steel Institute, 261 South Fourth street, Philadelphia, Pa., has issued its "Annual Statistical Report" giving the complete statistics of the production of iron and steel in the United States and Canada in 1912. The figures showing the production of leading classes of iron and steel in this country have already been printed by the bureau in the form of bulletins to the trade, nine such bulletins having been issued this year, and abstracts of these bulletins have been printed in *The Iron Age*, so that it is unnecessary to reproduce the figures here. The report now combines the figures given in the various bulletins with a great deal of other detailed statistical data, thus giving this information in readily available shape.

This report is a continuation of the work of the American Iron and Steel Association. It has a similar typographical appearance to the well-known statistical reports of that association, but appears in a blue cover instead of the familiar yellow cover in which the statistical reports have heretofore invariably appeared. The volume just issued comprises 160 pages, and is thus larger than previous reports. It enters much more fully into details than previously. The reader is enabled to see how much new matter has been introduced by asterisks in the table of contents.

The report is the work of William G. Gray, who is in charge of the Bureau of Statistics of the American Iron and Steel Institute. His work, as shown by the bulletins heretofore issued and by this complete report, is of such character as to indicate that the high reputation gained by the statistical work of the American Iron and Steel Association will not be dimmed by its transfer to the American Iron and Steel Institute.

Workmen's Compensation in Oregon

The United Metal Trades Association of the Pacific coast, Portland, Ore., advises that at the election held November 4 the people of Oregon approved of the workman's compensation act passed by the last Legislature. The Industrial Accident Commission has rented offices in the Masonic Building, Portland, and proposes to put the act in force December 1 of this year. The commission holds that, according to the law, employers shall have 28 days to file decisions not to come under the act. The Attorney-General of the State, however, holds that the law will not be effective until June 30, 1914, basing his opinion on that part of the act which says that it shall become effective June 30 following the taking effect of the act, and he holds that it did not take effect until the election, November 4. The United Metal Trades Association, however, advises Oregon employers that if they do not desire to come under the act it will be well to notify the commission before December 1 of this year.

On November 1 the association moved its office from 222 Commercial Club Building to 733 Morgan Building, Portland.

Canada as a Borrower and a Buyer

Sir George Paish, editor of the London Statist, made an address at the banquet of the Canadian Club in New York City on the evening of November 11, in the course of which he gave interesting figures on the investment of British capital in Canada and other countries. In Canada, he said, the investment has been considerably over $2,000,000,000. He stated that it is of the greatest importance that the United Kingdom should supply capital for the development of Canada, Argentina, Brazil and other countries for the purpose of insuring for itself the food and raw material it needs. In the course of his address he made the following statement: "The fact that the United States sells to Canada so great a quantity of goods is in part due to the fact that British capital flows so freely into Canada. Briefly expressed the position in the United Kingdom is as follows: We supply the capital, America in large measure supplies the goods, and Canada obtains the advantage."

Iron and Steel Institute 1914 Meetings

Secretary G. C. Lloyd, 28 Victoria street, London, S. W., England, announces that Thursday and Friday, May 7 and 8, 1914, have been fixed as the date of the next annual meeting of the Iron and Steel Institute. The annual dinner will take place May 7, at the Connaught Rooms, Great Queen street, W. C., London. On invitation of the Comite des Forges de France, the autumn meeting will be held in Paris, the dates of Friday and Saturday, September 18 and 19, having been provisionally fixed for the business sessions. The first half of the following week will be devoted to excursions to the chief iron mining and manufacturing districts of France. The Bessemer gold medal for 1914 will be awarded to Dr. Edward Riley, F.C.S., F.I.C.

The regular monthly meeting of the Associated Foundry Foremen of Philadelphia was held in that city on the evening of November 12. Balloting for officers for the coming year resulted as follows: President, Clarke Moore, Moore & White Company; vice-president, John McCoy, Philadelphia Chaplet & Mfg. Company; secretary-treasurer, H. A. White, Shannon & Co.; trustee, three years, Clarence R. Brown, E. E. Brown & Co. The paper for the evening's discussion was by W. A. Hall, Yale & Towne Mfg. Company, Stamford, Conn., on Yale & Towne foundry hoists, which was liberally illustrated by lantern slides.

September Iron and Steel Exports and Imports

The September report of the Bureau of Foreign and Domestic Commerce shows a decrease in iron and steel exports for September as compared with previous months. The total value of the exports of iron and steel and manufactures thereof, not including iron ore, in September was $22,831,082, against $23,947,440 in August, $24,170,604 in July and $25,228,346 in June. Import values for September, $2,428,841, compare with $2,415,212 in August and $3,080,683 in July.

The exports of commodities for which quantities are given totaled 213,055 gross tons in September, against 209,855 tons in August, 237,157 tons in July and 243,188 tons in June. Noteworthy changes in the exports were the increase in pipe and pipe fittings, 30,149 tons in September, against 20,071 tons in August, and the decrease in galvanized-iron sheets and plates from 9565 tons in August to 3599 tons in September.

Details of the exports of tonnage commodities for September and for nine months ended with September, compared with the corresponding periods of the previous fiscal year, are as follows:

Exports of Iron and Steel

	September		Nine months	
Commodities	1913, Gross tons	1912, Gross tons	1913, Gross tons	1912, Gross tons
Pig iron	21,018	21,282	206,038	193,979
Scrap	7,697	6,359	72,122	79,321
Bar iron	995	2,997	12,571	16,260
Wire rods	1,525	6,012	50,049	48,135
Steel bars	15,083	21,411	165,437	149,773
Billets, ingots and blooms, n. e. s.	3,813	23,499	85,717	223,446
†Bolts and nuts	2,105	1,633	17,401	*5,422
Hoops and bands	1,010	1,112	13,284	7,996
†Horse shoes	98	26	950	*215
Cut nails	186	399	2,680	7,831
†Railroad spikes	867	1,076	9,224	*3,262
Wire nails	2,732	4,628	34,976	56,363
All other nails, including tacks	253	269	3,045	7,207
Pipe and pipe fittings	30,149	20,046	240,810	192,272
Radiators and cast-iron house boilers	1,167	739	6,637	3,806
Steel rails	40,289	40,226	372,565	353,120
†Galvanized-iron sheets and plates	3,599	11,739	65,920	*40,127
All other iron sheets and plates	1,093	2,054	20,117	117,805
Steel sheets and plates	.....	.....	.....	§150,721
†Steel plates	14,134	20,571	184,146	*70,001
†Steel sheets	20,221	10,908	104,703	*28,471
Structural iron and steel	27,663	25,021	309,331	217,345
Tin and terne plates	4,238	6,623	48,620	66,722
Barbed wire	7,107	8,461	58,817	71,412
All other wire	6,013	11,343	82,917	115,822
Totals	213,055	248,434	2,168,377	2,226,834

*Figures cover period since July 1, 1912.
†Not separately stated prior to July 1, 1912.
§Figures are for January to June, inclusive.

In September the imports of commodities for which quantities are given totaled 19,939 tons, against 18,740 tons in August, 39,694 tons in July and 36,597 tons in June. September imports of billets, bars and steel plates were 2273 tons, as compared with 1561 tons in August. Details of the imports of commodities for which quantities are given for September and nine months ended with September, compared with the corresponding periods of the previous fiscal year, are as follows:

Imports of Iron and Steel

	September		Nine months	
Commodities	1913, Gross tons	1912, Gross tons	1913, Gross tons	1912, Gross tons
Pig iron	11,419	11,886	120,612	89,557
Scrap	1,292	1,741	37,866	13,114
Bar iron	1,897	1,344	22,859	18,137
Structural iron and steel	809	290	9,825	1,874
Billets, bars and steel plates, n. e. s.	2,273	1,621	17,765	13,721
Steel rails	845	359	4,407	2,854
Sheets and plates	266	190	2,556	2,631
Tin and terne plates	180	207	15,602	1,502
Wire rods	958	1,100	12,664	10,736
Totals	19,939	18,738	244,156	154,126

The imports of iron ore in September were 295,424 gross tons, against 213,139 tons in August, 272,017 tons in July and 180,571 tons in September, 1912.

The total value of the exports of iron and steel and manufactures thereof, not including iron ore, for the nine months ended with September was $226,481,976, against $213,699,572 for the corresponding period of last year. The value of the imports of iron and steel and manufactures thereof, exclusive of iron ore, for the nine months ended with September, 1913, was $25,716,377, as compared with $21,111,860 for the corresponding period of 1912.

Export Bounties on German Iron

According to the Board of Trade Journal, London, England, information has been received to the effect that the leading syndicates in the coal and iron industries are making a determined effort to maintain steady prices at home. Foreign sales are facilitated by export bounties, which are paid by a central bureau in Düsseldorf, known as the Aberchnungstelle fur die Ausfuhrvergutung. From the first of last month the Coal Syndicate is allowing 1.50 marks (36c.) per metric ton (2204.6 lb.) upon fuel purchased from it, if the fuel is proved to have been used in making iron goods actually exported, while the Raw Iron Syndicate grants a bounty on raw iron purchased from it and used to manufacture articles for export, this bounty, with that of the Coal Syndicate, amounting to 4.50 marks ($1.07) per metric ton. On June 1 the bounty of 10 marks ($2.38) per metric ton allowed by the Steel Works Union on half-finished goods exported was increased to 15 marks ($3.57) and the purchase price for half-finished material to be used for the manufacture of articles for export was reduced by a further 5 marks ($1.19) per ton. The bounties allowed by the Rolled Wire Syndicate have been increased to 11.50 marks ($2.74) per ton as regards raw material used for iron wire and wire goods made from rolled wire, and to 16.50 ($3.93) marks for material used for wire tacks. A reduction of 5 marks ($1.19) per ton is also made in the purchase price of raw material used for making goods for export.

Commenting on this subject the Engineer, London, says: If the amount of the bounties on coal and coke and partly manufactured steel is deducted from the inland price of billets, it is found that the inland price of the latter works out at practically the same as the present export price f.o.b. Antwerp. Thus the mills which work for the export trade are placed at a disadvantage, inasmuch as they have to bear the cost of transport to the seaport, although this difficulty is probably fully counterbalanced by the freight rate which has to be paid to the destination of foreign purchasers of semi-finished steel. The ordinary steel works and foundries, however, find it exceedingly difficult to compete with the increasing domination of the export trade by the large self-contained units—those which produce from raw materials to finished products—which are determined to secure a market irrespective of the cost, and thus exercise the pressure experienced by British steel makers in the home market.

The Eastern Freight Rate Hearing

WASHINGTON, D. C., November 18, 1913.—On Monday next the Interstate Commerce Commission will begin its hearing into the proposed increases in freight rates by Eastern railroads, and it is expected that the proceeding will be one of the most important ever undertaken by the commission, as upon it depends whether the carriers can proceed with plans for improvements, the ordering of new equipment, etc. It is expected that the proceedings will open by statements of the presidents of the leading Eastern companies, these to be followed by officials of the railroads with exhibits showing increases in operating expenses and corresponding decreases in revenue.

The tariffs which were filed with the commission some time ago showed an average increase of 5 per cent., but in many instances the increase amounted to 16 per cent. They were filed to become effective November 15, but were suspended by the commission until March, 1914. Representatives of the carriers express the hope that the case will be decided before that date. In view of the stand taken by the commission and public opinion generally regarding steel coaches, it is believed here that the carriers will be allowed to make a substantial increase in rates in order to allow them to furnish such coaches and other equipment conducive to safety. W. L. C.

Edward P. Jones has been appointed receiver of the Enamel Pipe & Engineering Company, Elyria, Ohio. It is expected that the company's financial difficulties will be only temporary.

The Iron and Metal Markets

Production Still Declining

Demand Less and Prices Lower

Standard Oil Company Buys Welsh Tin Plates—Steel Works at Two-Thirds Capacity

The slowing down in iron and steel operations continues and in the case of some steel companies has been more sharply accented in the past week. Buyers of steel products are said to be awaiting developments, which is another way of saying that they are expecting lower prices and therefore do not consider this the time to make contracts.

It is not easy to measure the extent to which manufacturing consumers of finished steel have curtailed output. Automobile companies are known to have reduced forces considerably. Agricultural machinery interests, judging from the falling off in their bar specifications, are operating at a good deal less than full capacity. This is apparently not due to an unfavorable outlook for next year's crops, for prospects as gauged by planting are good; but rather to the belief that lower prices for their raw materials can be had later, and that general business conditions do not warrant full headway now.

Railroad buying has not improved and early betterment is not indicated. Some of the rail mills are close to the point where very limited operations if not shut downs will be forced unless they can get orders for winter rolling. The Pennsylvania Railroad contract will be considered at a board meeting next week. As in every recent year, new features will appear in this company's specification having a bearing on mill costs and the adjustment of these takes time. The Steel Corporation has taken about 12,000 tons of rails, in addition to the Louisville & Nashville contract, and the Pennsylvania Steel Company has booked 2500 tons for the B. & O. and 1000 tons for the Pere Marquette.

The car orders for the week include 500 steel cars for the Lehigh & New England and 500 for the Wabash, which presumably has also placed 500 others; and contracts for 2200 steel underframes have been let by other roads.

Railroad, agricultural machinery and automobile lines, though specifically mentioned above, have not been alone in the contraction of steel consumption. It is noticed in less important industries and its extent and suddenness have been a surprise to the steel trade at large. The entire industry is now close to a two-thirds operation of finishing mills. In the East two or three steel plants are running to but 40 per cent. of capacity, and one Eastern producer of billets and sheets may shut down this week. Our Pittsburgh report says that the adjustment of production to demand required the laying off of 2000 men by one steel company there last week and that other producers are reducing forces besides running fewer turns per week.

Foundries have not been as much affected thus far as concerns which use rolled steel. The former were laggards in the improvement of two years ago and are correspondingly tenacious of business now. Thus the relatively full rate at which foundry pig iron is being shipped is still a matter of comment.

The decline in prices of rolled steel is slow but steady. Black sheets have sold at 1.95c., Pittsburgh, for No. 28, or $1 less than last week's price. This level while $3 a ton below the low point of 1909 is still $4 a ton above that of 1911, when 1.75c. was reached.

Eastern inquiry has come up for billets for the first half of 1914, but it is evidently not taken seriously as buyers and sellers are far apart.

The situation as to imports is unchanged. Eastern representatives of one European steel company have had scores of inquiries for prices from new sources without closing any business. Domestic consumers talk of foreign offers and of import possibilities, but all hesitate to make the plunge, preferring home products of known quality even at a higher price.

The Standard Oil Company, our London cable says, has bought 200,000 boxes of tin plates from Welsh makers for January and February shipment at 13 s. 6 d. for quarters and 18 s. 6 d. for 20 x 10 plates, presumably drawback business. Welsh works are also reported to have booked a large British Columbian order in competition with the United States.

Pig iron prices still tend downward and some recent sales by Eastern furnaces have been at cost to keep furnaces in operation. Further sales of Southern iron at $10.50 at Birmingham for No. 2 are reported, but confirmation is lacking of the rumored sale of 20,000 tons of pipe iron on a $10 No. 2 basis, direct denial coming from the company generally credited with this sale. Negotiations for 35,000 to 40,000 tons of Southern iron for pipe works, first half delivery, are under way.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type. Declines in Italics

At date, one week, one month, and one year previous.

	Nov. 19, 1913.	Nov. 12, 1913.	Oct. 22, 1913.	Nov. 20, 1912.
Pig Iron, Per Gross Ton:				
Foundry No. 2 X, Philadelphia.	$15.50	$15.50	$16.00	$18.25
Foundry No. 2, Valley furnace.	13.50	13.50	13.75	17.00
Foundry No. 2 S'th'n, Cin'ti....	13.75	13.75	14.50	17.25
Foundry No. 2, Birmingham, Ala.	10.50	10.50	11.25	14.00
Foundry No. 2, furnace, Chicago*	*14.75*	15.00	15.00	18.00
Basic, delivered, eastern Pa....	15.00	15.00	15.25	18.25
Basic, Valley furnace.....	*13.00*	13.25	13.75	16.50
Bessemer, Pittsburgh	*15.90*	16.15	16.65	18.15
Malleable Bessemer, Chicago*...	*14.75*	15.00	15.50	18.00
Gray forge, Pittsburgh.....	14.25	14.25	14.30	16.75
Lake Superior charcoal, Chicago	15.25	15.25	15.25	18.75
Billets, etc., Per Gross Ton:				
Bessemer billets, Pittsburgh....	*20.50*	21.00	23.00	27.00
Open-hearth billets, Pittsburgh..	*20.50*	21.00	23.00	27.50
Open-hearth sheet bars, P'gh...	*21.00*	21.50	23.50	28.00
Forging billets, Pittsburgh.....	26.00	26.00	27.00	34.00
Open-hearth billets, Philadelphia	22.90	22.90	24.00	32.00
Wire rods, Pittsburgh	26.00	26.00	26.50	30.00
Old Material, Per Gross Ton:				
Iron rails, Chicago	13.50	13.50	14.00	18.00
Iron rails, Philadelphia	*17.00*	17.50	17.50	19.00
Carwheels, Chicago	12.00	12.00	12.00	17.00
Carwheels, Philadelphia	12.00	12.00	12.00	15.00
Heavy steel scrap, Pittsburgh...	11.50	11.50	11.75	15.00
Heavy steel scrap, Philadelphia.	*10.00*	10.25	11.00	15.50
Heavy steel scrap, Chicago.....	9.50	9.50	10.00	13.50
No. 1 foundry cast, Pittsburgh..	12.00	12.00	12.50	15.00
No. 1 foundry cast, Philadelphia	12.50	12.50	13.50	14.75
No. 1 f'dry cast, Ch'go (net ton)	10.00	10.00	10.25	13.25
Finished Iron and Steel, Per Pound to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bessemer rails, heavy, at mill...	1.25	1.25	1.25	1.25
Iron bars, Philadelphia	*1.27½*	1.30	1.32½	1.67½
Iron bars, Pittsburgh	1.40	1.40	1.55	1.65
Iron bars, Chicago.....	1.15	1.15	1.25	1.55
Steel bars, Pittsburgh	1.30	1.30	1.40	1.60
Steel bars, New York.....	1.46	1.46	1.56	1.76
Tank plates, Pittsburgh.....	1.25	1.25	1.35	1.60
Tank plates, New York.....	1.41	1.41	1.51	1.76
Beams, channels & angles, P'gh.	1.30	1.30	1.35	1.70
Beams, channels & angles, N. Y.	1.46	1.46	1.51	1.86
Skelp, grooved steel, Pittsburgh.	1.25	1.25	1.35	1.45
Skelp, sheared steel, Pittsburgh.	1.35	1.35	1.45	1.50
Steel hoops, Pittsburgh.....	*1.45*	1.50	1.60	1.50
Sheets, Nails and Wire, Per Pound to Large Buyers:				
Sheets, black, No. 28, Pittsburgh	*1.95*	2.00	2.05	2.25
Galvanized sheets, No. 28, Pgh.	*2.95*	3.00	3.10	3.40
Wire nails, Pittsburgh.....	1.60	1.60	1.60	1.70
Cut nails, f.o.b. Eastern mills..	1.65	1.65	1.65	1.75
Cut nails, Pittsburgh	1.55	1.55	1.55	1.70
Fence wire, ann'l'd, 0 to 9, P'gh.	1.40	1.40	1.40	1.50
Barb wire, galv., Pittsburgh....	2.00	2.00	2.00	2.10

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Coke, Connellsville, Per Net Ton at Oven:	Nov. 19, 1913.	Nov. 12, 1913.	Oct. 22, 1913.	Nov. 20, 1912.
Furnace coke, prompt shipment	*$1.80*	$1.85	$2.00	$3.85
Furnace coke, future delivery	2.00	2.00	2.10	3.00
Foundry coke, prompt shipment	*2.60*	2.65	2.75	4.25
Foundry coke, future delivery	2.75	2.75	3.00	3.75

Metals, Per Pound to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	*16.00*	16.25	17.00	17.75
Electrolytic copper, New York	*15.25*	15.50	16.75	17.62½
Spelter, St. Louis	5.15	5.15	5.20	7.35
Spelter, New York	5.30	5.30	5.35	7.50
Lead, St. Louis	4.20	4.20	4.20	4.50
Lead, New York	4.35	4.35	4.35	4.65
Tin, New York	**40.15**	39.50	40.35	49.65
Antimony, Hallett's, New York	7.25	7.25	7.12½	9.75
Tin plate, 100-lb. box, Pittsburgh	$3.40	$3.40	$3.50	$3.60

Finished Iron and Steel f. o. b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Louis, 22½c.; Kansas City, 42½c.; Omaha, 42½c.; St. Paul, 32c.; Denver, 84½c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier, 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.25c. to 1.30c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers with extras:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3-16 in. take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras.	Cents per lb.
Gauges under ¼ in. to and including 3-16 in.	.10
Gauges under 3-16 in. to and including No. 8	.15
Gauges under No. 8 to and including No. 9	.25
Gauges under No. 9 to and including No. 10	.30
Gauges under No. 10 to and including No. 12	.40
Sketches (including straight taper plates) 3 ft. and over	.10
Complete circles 3 ft. in diameter and over	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive	.05
Widths over 110 in. up to 115 in., inclusive	.10
Widths over 115 in. up to 120 in., inclusive	.15
Widths over 120 in. up to 125 in., inclusive	.25
Widths over 125 in. up to 130 in., inclusive	.50
Widths over 130 in.	1.00
Cutting to lengths, under 3 ft., to 2 ft., inclusive	.25
Cutting to lengths, under 2 ft., to 1 ft., inclusive	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees, 3 in. and over, 1.30c. to 1.35c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in. on one or both legs	.10
Angles, 3 in. on one or both legs, less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, hand rail, car-truck, and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Hand rail tees	.75
Cutting to lengths, under 3 ft., to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Wire Rods and Wire.—Bessemer, open-hearth and chain rods, $26. Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent. discount in 10 days, carload lots to jobbers, annealed, $1.40; galvanized, $1.80. Galvanized barb wire, to jobbers, $2; painted, $1.60. Wire nails, to jobbers, $1.60.

The following table gives the price to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	0 to 9	10	11	12 & 12½	13	14	15	16
Annealed	$1.60	$1.65	$1.70	$1.75	$1.85	$1.95	$2.05	$2.15
Galvanized	2.05	2.05	2.10	2.15	2.25	2.35	2.75	2.85

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on steel pipe in effect from October 27, 1913, and iron pipe from June 2, 1913, all full weight:

Butt Weld.

Steel. Inches.	Black.	Galv.	Iron. Inches.	Black.	Galv.
⅛, ¼ and ⅜	73	52½	⅛ and ¼	66	47
½	77	66½	⅜	65	46
¾ to 3	80	71½	½	69	56
			¾ to 2½	72	61

Lap Weld.

2	77	68½	1¼	56	45
2½ to 6	79	70½	1½	67	56
7 to 12	76	65½	2	68	58
13 to 15	53	..	2½ to 4	70	61
			4½ to 6	70	61
			7 to 12	68	55

Reamed and Drifted.

1 to 3, butt	78	69½	1 to 1½, butt	70	59
2, lap	75	66½	2, butt	70	59
2½ to 6, lap	77	68½	1¼, lap	54	43
			1½, lap	65	54
			2, lap	66	56
			2½ to 4, lap	68	59

Butt Weld, extra strong, plain ends.

⅛, ¼ and ⅜	68	57½	⅛	63	52
½	73	66½	¼	67	60
¾ to 1½	77	70½	⅜	71	62
2 to 3	78	71½	¾ to 1½	72	63
			2 and 2½	72	63

Lap Weld, extra strong, plain ends.

2	74	65½	1½	65	59
2½ to 4	76	67½	2	66	58
4½ to 6	75	66½	2½ to 4	70	61
7 to 8	68	57½	4½ to 6	69	60
9 to 12	63	52½	7 and 8	63	53
			9 to 12	58	47

Butt Weld, double extra strong, plain ends.

½	63	56½	½	57	49
¾ to 1½	66	59½	¾ to 1½	60	52
2 to 2½	68	61½	2 and 2½	62	54

Lap Weld, double extra strong, plain ends.

2	64	57½	2	55	49
2½ to 4	66	59½	2½ to 4	60	54
4½ to 6	65	58½	4½ to 6	59	53
7 to 8	58	47½	7 to 8	52	42

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts to jobbers, in carloads on lap-welded steel, in effect from May 29, 1913, and standard charcoal-iron boiler tubes, in effect from January 1, 1913, are as follows:

Lap-Welded Steel.		*Standard Charcoal Iron.*	
1¼ and 2 in.	60	1½ in.	44
2¼ in.	57	1¾ and 2 in.	48
2½ and 2¾ in.	63	2¼ in.	44
3 and 3¼ in.	67	2½ to 2¾ in.	53
3½ to 4½ in.	69	3 and 3¼ in.	55
5 and 6 in.	63	3½ to 4½ in.	58
7 to 13 in.	60	Locomotive and steamship special grades bring higher prices.	

2½ in. and smaller, over 18 ft., 10 per cent. net extra.
2¾ in. and larger, over 22 ft., 10 per cent. net extra.
Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft., and all shipments going west of the Mississippi River must be sold f.o.b. mill at Pittsburgh basing discount, lowered by two points.

Sheets.—Makers' prices for mill shipment on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30 days net or 2 per cent. cash discount in 10 days from date of invoice:

Blue Annealed Sheets.

	Cents per lb.
Nos. 3 to 8	1.45 to 1.50
Nos. 9 and 10	1.50 to 1.55
Nos. 11 and 12	1.55 to 1.65
Nos. 13 and 14	1.60 to 1.70
Nos. 15 and 16	1.70 to 1.75

Box Annealed Sheets, Cold Rolled.

Nos. 10 and 11	1.60 to 1.65
No. 12	1.60 to 1.65
Nos. 13 and 14	1.65 to 1.70
Nos. 15 and 16	1.70 to 1.75
Nos. 17 to 21	1.75 to 1.80
Nos. 22 and 24	1.80 to 1.85
Nos. 25 and 26	1.85 to 1.90
No. 27	1.90 to 1.95
No. 28	1.95 to 2.00
No. 29	2.00 to 2.05
No. 30	2.10 to 2.15

Galvanized Sheets of Black Sheet Gauge

Nos. 10 and 11	1.95 to 2.00
No. 12	2.05 to 2.10
Nos. 13 and 14	2.05 to 2.10
Nos. 15 and 16	2.20 to 2.25
Nos. 17 to 21	2.35 to 2.40
Nos. 22 and 24	2.50 to 2.55
Nos. 25 and 26	2.65 to 2.70
No. 27	2.80 to 2.85
No. 28	2.95 to 3.00
No. 29	3.10 to 3.15
No. 30	3.25 to 3.30

Pittsburgh

PITTSBURGH, PA., November 19, 1913.

It is strictly a buyer's market in every sense of the term. Some in the trade believe that present conditions, as regards the amount of new business being placed, are fully as bad as in the winter of 1907-8. Prices have not seriously declined the past week, but there is a steady settling down. Hardly enough new business is being placed to make a market. Restriction of operations is going on in earnest, one local steel company having laid off close to 2000 men and other producers are laying off every man that can be spared. All the mills are operating on a reduced number of turns per week, and it is asserted that before the first of the year steel operations will be down to about 50 per cent. of capacity. Foreign material, notably steel bars, is being offered at low prices at Boston, Galveston, Philadelphia and New York, but so far as can be learned, little or no business has resulted. These offerings, however, are disturbing the market and helping to unsettle prices. Semi-finished steel is weak and lower. Prices on sheets have gone off $1 per ton. A fair amount of tin plate has been sold for next year's delivery at the $3.40 base price, the usual differential having been allowed to the very large consumers. As pointed out before, the encouraging feature of the situation is that when buyers send in orders, which are usually small, they invariably want prompt shipments, showing that stocks have been reduced to a minimum. No improvement in buying is looked for until after the first of the year.

Pig Iron.—No sales of moment are reported. A local pig-iron house has been offering basic iron freely at $13 and Bessemer at $15, Valley furnace, but without finding buyers. Local consumers are covered over the remainder of the year and do not seem to be interested at any price. For the first time in some months pig iron is being piled at most of the steel works that have blast furnaces. We quote: Bessemer iron, $15 to $15.25; basic, $13 to $13.25; No. 2 foundry, $13.50 to $13.75; malleable Bessemer, $13.75 to $14; gray forge, $13.35, all at Valley furnace. The freight rate for delivery in the Pittsburgh or Cleveland district from Valley furnaces is 90c. a ton.

Billets and Sheet Bars.—What prices would be named by the mills if any new business was offering is uncertain. Several large local consumers have been approached with a request to make offers, but have not done so, as they do not need the steel. We quote Bessemer and open-hearth 4 x 4 in. billets at $20.50, and Bessemer or open-hearth sheet bars at $21 to $21.50, Pittsburgh or Youngstown mills. Some of the smaller mills are offering open-hearth billets and sheet bars at 50c. to $1 a ton under these prices, but in limited quantities and for spot delivery. Forging billets are about $26 and axle billets about $24, maker's mill, Pittsburgh.

Muck Bar.—The puddling mills of the A. M. Byers Company, Girard, and the Youngstown Sheet & Tube Company, East Youngstown, Ohio, are gradually being supplied with non-union puddlers, and both plants are expected to be in full operation in a short time. There is still a scarcity in the supply of muck bar, but the new demand is quiet. We quote best grades, made from all pig iron, at about $31, Pittsburgh.

Steel Rails.—New orders for standard sections are confined to small lots for quick delivery. The leading railroads are slow in coming in the market for their next year's requirements. The new demand for light rails is holding up well, the Carnegie Steel Company having received orders and specifications the past week for over 2000 tons. We quote splice bars at 1.50c. per lb. and standard section rails at 1.25c. per lb. Light rails are quoted as follows: 25, 30, 35, 40 and 45 lb. sections, 1.25c.; 16 and 20 lb., 1.30c.; 12 and 14 lb., 1.35c., and 8 and 10 lb., 1.40c., all in carload lots, f.o.b. Pittsburgh.

Plates.—The Lehigh & New England Railroad has placed 500 steel hoppers with the Pressed Steel Car Company and 200 steel gondolas with the Cambria Steel Company. Active inquiries include 1000 steel hoppers for the Lehigh Valley, 400 steel hoppers for the Morgantown & Kingwood and 400 steel hoppers for the New England Coal & Coke Company. The Wabash is still in the market for 1000 steel hoppers and the Buffalo, Rochester & Pittsburgh for 1000 gondolas and 1000 box cars. Reliable information is that the New York Central Lines has decided to buy 18,000 cars, but for the present only 5000 will be bought, and inquiries for these are expected to come out in a short time. It is also believed that shortly after the first of the year orders will be placed for a number of ore boats to replace those lost in the recent storms on the Great Lakes. The new demand for plates is dull, and prices are weaker than on any other line of finished material. The open market on plates is 1.25c. for ¼ in. and heavier, but some of the smaller mills that roll limited sizes are quoting 1.20c.

Structural Material.—New inquiry is dull, and no important local contracts have been placed. The city of Pittsburgh is expected to place in a short time 2700 tons of material for a new steel bridge in the Homewood district. While the leading structural shops are pretty well filled for the next two or three months, new work will likely be quiet until after the first of the year. We quote beams and channels up to 15 in. at 1.30c., Pittsburgh, but a lower figure would be named on any desirable tonnage.

Wire Rods.—New buying is light, and specifications against contracts are not satisfactory. We quote Bessemer, open-hearth and chain rods at $26, Pittsburgh.

Ferroalloys.—Consumption of ferromanganese has fallen off, owing to cutting down of operations by the steel mills. Most consumers are covered over the remainder of this year, and some through the first half of next year. The $50 price on English 80 per cent. is reported as being firmly held, but German, which runs slightly higher in sulphur, is offered at $49, seaboard. We quote 80 per cent. foreign ferromanganese at $50, Baltimore, the freight rate to the Pittsburgh district being $2.16 a ton. We quote 50 per cent. ferrosilicon, in lots up to 100 tons, at $75; over 100 tons to 600 tons, $74; over 600 tons, $73, Pittsburgh. We quote 10 per cent. ferrosilicon at $22; 11 per cent., $23, and 12 per cent., $24, f.o.b. cars Jackson County, Ohio, or Ashland, Ky., furnaces. We quote 20 per cent. spiegeleisen at $25 at furnace. We quote ferrotitanium at 8c. per lb. in carloads; 10c. in 2000-lb. lots and over, and 12c. in lots up to 2000 lb.

Skelp.—There is not much new demand, but the mills are pretty well filled with orders to the end of the year. Sales of grooved steel skelp in narrow sizes have been made at 1.25c. at Wheeling and Youngstown mills. We quote grooved steel skelp at 1.25c. to 1.30c.; sheared steel skelp, 1.35c.; grooved iron skelp, 1.60c. to 1.65c., and sheared iron skelp, 1.65c. to 1.70c., Pittsburgh.

Iron and Steel Bars.—The new demand for steel bars is quiet, but specifications against contracts are being received in moderate volume, and the mills are pretty well fixed with actual orders for their output to the end of the year. The new demand for iron bars is dull and prices are weak. We quote steel bars at 1.30c., but lower prices have been named f.o.b. Pittsburgh, to meet foreign competition, notably at Boston, Galveston and Philadelphia. On any desirable orders from domestic consumers 1.25c. would be named for steel bars. We quote iron bars at 1.40c. to 1.45c., Pittsburgh, but on a desirable order 1.35c. could be done.

Sheets.—A fair amount of new business is being placed, but it is made up mostly of small lots to cover current needs. Most mills are still refusing to accept contracts for delivery over the first half of next year at present prices, and some are refusing to sell beyond December 31. Operations of mills are getting steadily lighter and range from 50 to 65 per cent. Prices on black and galvanized are slightly lower, but several of the larger makers state that on most of their shipments prices are not below 2c. on 28 black and 3c. on 28 galvanized. We quote Nos. 9 and 10 blue annealed sheets at 1.50c.; No. 28 Bessemer black, 1.95c. to 2c.; No. 28 galvanized, 2.95c. to 3c.; No. 28 tin mill black plate, H.R. and A., 1.95c., and Nos. 29 and 30, 2c. for delivery over the remainder of this year, while for first quarter No. 28 black plate is held at 2c. and Nos. 29 and 30 at 2.05c. These prices are f.o.b. Pittsburgh, in carload and larger lots, jobbers charging the usual advances for small lots from store.

Tin Plate.—Leading makers state that a fair number of contracts have been placed by leading consumers for delivery over next season, most of this business going at the regular base price of $3.40 per base box for coke plates, while the usual differential has been allowed to the large consumers, as has been the custom for years. The fixing of the price at $3.40 per base box brought out a fair amount of new business for delivery over this month and December, but mostly in small lots. Several of the larger mills state they are running to nearly full capacity, while others are operating only from 50 to 65 per cent. It is probable that not more than 60 per cent., if that much, of the tin plate capacity is in operation at present. We quote 100 lb. cokes at $3.40 and 100 lb. ternes at $3.30 per base box f.o.b. Pittsburgh.

Spikes.—Several makers state that new buying is perhaps a little better, but the demand is still for small lots to cover current needs. None of the railroads is in the market, and present conditions in the spike trade are very unsatisfactory to the makers. We quote railroad spikes in base sizes, 5½ x 9/16 in., at $1.55, but on a desirable order this price would be shaded. We quote small railroad and boat spikes at $1.60 per 100 lb., f.o.b., Pittsburgh.

Bolts and Rivets.—The new demand for nuts, bolts and rivets is confined mostly to small lots, consumers still pursuing the policy of buying only for actual needs. The new discounts on nuts and bolts, which went into effect three or four weeks ago, are not being strictly observed. Regular prices on rivets of $1.80 for button head and $1.90 for cone head have also been shaded on some recent orders. We quote button-head structural rivets at $1.75 to $1.80, and cone-head boiler rivets at $1.85 to $1.90, in large lots, an advance of about $2 a ton over these prices being charged for small lots. Terms 30 days net, less 2 per cent. for cash in 10 days. The discounts on nuts and bolts are as follows: In lots of 300 lb. or over, delivered within a 20c. freight radius of makers' works:

Coach and lag screws	80 and 20% off
Small carriage bolts, cut threads	75 and 17½% off
Small carriage bolts, rolled threads	80 and 2½% off
Large carriage bolts	70 and 15% off
Small machine bolts, cut threads	80 and 2½% off
Small machine bolts, rolled threads	80 and 7½% off
Large machine bolts	75 and 10 and 2½% off
Machine bolts, with C.P.C. and T nuts, small,	70 and 12½% off
Machine bolts with C.P.C. and T nuts, large,	70 and 12½% off
Square hot pressed nuts, blanked and tapped	$6.00 off list
Hexagon nuts	$6.70 off list
C.P.C. and R square nuts, tapped and blanked	$5.80 off list
Hexagon nuts, ⅜ and larger	$6.80 off list
Hexagon nuts, smaller than 9/16	$7.40 off list
C.P. plain square nuts	$5.30 off list
C.P. plain hexagon nuts	$5.70 off list
Semi-finished hexagon nuts, ⅝ and larger	85 and 10% off
Semi-finished hex. nuts, smaller than 9/16	85, 10 and 5% off
Rivets, 7/16 x 6½, smaller and shorter	80 and 10% off
Rivets, metallic tinned, bulk	80 and 10% off
Rivets, tin plated, bulk	80 and 10% off
Rivets, metallic tinned, packages	80 and 10% off
Standard cap screws	75, 10, 10 and 7½% off
Standard set screws	75, 10, 10 and 7½% off

NOTE.—A typographical error was made last week in printing a 30c. freight radius instead of the correct 20c.

Shafting.—New orders for shafting continue to be confined to small lots to cover actual needs, and specifications against contracts are still dull. A leading automobile concern recently placed a contract for a considerable tonnage of shafting, and on this a discount of 65 per cent. off list was allowed. However, only on very desirable business would such a heavy discount be given. We quote cold-rolled shafting at 62 to 63 per cent. off list in carload lots. Makers have tried to maintain the market at a minimum of 63 per cent. off. We quote small lots at 60 per cent. off delivered in base territory.

Hoops and Bands.—New orders are slow and only for small lots to cover actual needs. Makers realize that to name lower prices would not stimulate new business in the slightest, as consumers are not in a buying mood. We quote steel bands at 1.30c., with extras as per the steel bar card, and steel hoops at 1.45c. to 1.50c. Not enough new business is being placed in hoops or bands to test the market.

Wire Products.—The buying season is over, and little new business is being placed, but the mills state that specifications against contracts are coming in at a fair rate. The regular prices of $1.60 on wire nails and $1.40 on plain annealed wire are still being shaded about $1 a ton, but mostly for delivery to points in competition with Ohio River mills that have the benefit of low rates of freight. We quote wire nails to jobbers, $1.60; cut nails, $1.60; plain annealed wire, $1.40; galvanized barb wire, $2, and painted barb wire, $1.60 f.o.b. Pittsburgh, per 100 lb., usual terms, actual freight added to points of delivery.

Merchant Steel.—New business is confined to small lots to cover actual needs, and specifications against contracts are dull. In fact, hardly enough new business is being placed to test prices, which are purely nominal. We quote: Iron finished tire, 1½ x ½ in. and larger, 1.35c., base; under 1½ x ½ in., 1.50c.; planished tire, 1.55c.; channel tire, ¾ to ⅞ and 1 in., 1.85c. to 1.95c.; 1⅛ in. and larger, 1.95c.; toe calk, 1.95c. to 2.05c., base; flat sleigh shoe, 1.70c.; concave and convex, 1.75c.; cutter shoe, tapered or bent, 2.25c. to 2.35c.; spring steel, 1.95c. to 2.05c.; machinery steel, smooth finish, 1.80c. We quote cold-rolled strip steel as follows: Base rates for 1 in. and 1½ in. and wider, under 0.20 carbon, and No. 10 and heavier, hard temper, 3.25c.; soft, 3.50c.; coils, hard, 3.15c.; soft, 3.40c.; freight allowed. The usual differentials apply for lighter gauges and sizes.

Standard Pipe.—There is a fair seasonable demand for iron and steel pipe, but no large orders are being placed, and buying of large pipe for the season is over. Reports are that the receivers of the Kansas Natural Gas Company have been granted permission by the courts to spend $1,000,000 in betterments, and if this is true it will probably be a heavy buyer of pipe later on. The demand for oil country goods is active, as drilling operations are going on at a good rate. The mills state that present discounts, which are printed on a previous page, are being firmly held.

Boiler Tubes.—New business in boiler tubes is light and only in small lots. Competition among mills is severe, and discounts on both steel and charcoal-iron boiler tubes are being more or less shaded.

Iron and Steel Scrap.—There is no betterment whatever in conditions in the scrap trade. Consumers that have scrap bought are insisting that dealers ship it in, as they want it in their yards before the first of the year, but as stock-taking time is getting close at hand new buying is not likely to get any better until January. Prices are about stationary, but in one or two cases selected heavy steel scrap has sold as low as $11.25, consumer's mill, and bundled sheet scrap has sold at $6.50 delivered. Not enough scrap is being sold to fix actual prices. Dealers are quoting about as follows per gross ton for delivery in the Pittsburgh and other districts:

Selected heavy steel scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh delivery	$11.50
Compressed side and end sheet scrap	10.25
No. 1 foundry cast	$12.00 to 12.25
No. 2 foundry cast	10.75 to 11.00
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	6.50 to 6.75
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	13.50 to 13.75
No. 1 railroad malleable stock	11.25 to 11.50
Grate bars	7.50 to 7.75
Low phosphorus melting stock	14.00 to 14.25
Iron car axles	24.25 to 24.75
Steel car axles	17.25 to 17.50
Locomotive axles, steel	20.75 to 21.25
Locomotive axles, iron	25.25 to 25.75
No. 1 busheling scrap	11.25
No. 2 busheling scrap	7.00
*Machine shop turnings	6.50
Old carwheels	13.00 to 13.25
*Cast-iron borings	7.25 to 7.50
†Sheet bar crop ends	13.50 to 13.75
Old iron rails	14.25 to 14.50
No. 1 railroad wrought scrap	13.50 to 13.75
Heavy steel axle turnings	8.75 to 9.00
Stove plate	7.50 to 7.75

*These prices are f.o.b. cars at consumers' mills in the Pittsburgh district.
†Shipping point.

Coke.—Coke has declined slightly the past week, and we note sales of 15,000 tons or more of strictly high grade blast furnace coke at $1.80 per net ton at oven. Some inquiry for furnace coke is in the market for first half, but so far no business has been closed. Several coke operators quote $2 for first half, but furnaces do not seem disposed to pay this price, insisting that under present conditions in the pig-iron market the best grades of furnace coke should not be above $1.75 at oven. As the consumption of coke is decreasing by reason of the blowing out of a number of blast furnaces, some of the coke operators are not able to sell all their coke and are blowing out ovens. Prices on foundry coke have also declined and the demand is quiet. We quote standard makes of furnace coke for delivery over the remainder of this year at $1.80 to $1.85, and best makes of 72-hr. foundry coke at $2.60 to $2.75 per net ton at oven to consumers. Some makes of furnace and foundry coke running slightly high in sulphur are offered at lower figures. The Connellsville Courier reports the output of coke in the Upper and Lower Connellsville regions last week as 354,045 net tons, a decrease over the previous week of over 21,000 tons.

Chicago

CHICAGO, ILL., November 17, 1913.

Curtailment of purchases is rapidly bringing iron and steel production near the minimum. For all products prices are gradually declining into an alignment with the restricted demand for material. Pig iron, which has in this market presented a fairly firm front up to the past ten days because of the large number of furnaces out of blast, is now quotable at prices which are a step toward meeting offers from melters who would undoubtedly be glad to cover for the first quarter before long. Recent quotations for the principal steel products, some of which show a further decline of $1 a ton, are not so much representative of the market strength or weakness as they are of the

willingness of the mills to meet buyers' views where sufficiently attractive business is at stake. Concessions of $3 a ton would undoubtedly be made as quickly as $1 a ton if such concession would result in a buying movement. Sheared plates are selling at 1.43c., Chicago, and desirable specifications for steel bars for prompt shipment can be placed on the same basis. For universal mill plates and structural shapes 1.30c., Pittsburgh, continues to be the minimum quotation. Concerning mill operations it is conceded that a further restricting of output is unavoidable.

Pig Iron.—Approaching the month of December, pig iron alone gives promise of breaking the monotony of an exceedingly lifeless month. Most melters of pig iron would prefer to make their contracts for the first quarter and first half, even though on a conservative basis, before the end of the year and quotations that are beginning to appear, particularly for Southern iron, will undoubtedly bring producers and consumers together in the near future on the question of price. Thus far sales are few and inquiries light. The purchase of a comparatively small tonnage by one of the largest buyers in this market, the quantity being reported as 5000 tons, is without significance except to emphasize the present "tiding over" policy in buying. Other inquiries, one for 500 tons but more for much smaller quantities, are noted. Among the Lake irons the more noticeable concessions are noted in connection with malleable Bessemer, sales of which, in carload and small lots, are authenticated at prices as low as $14.60, f.o.b. furnace. More or less off iron for gray-iron foundry consumption is moving at special prices which represent a concession from the $15 basis. Southern iron in this market, probably for the reason that inquiry is very light, has not shown the degree of weakness evidenced elsewhere, and $11 for No. 2 at Birmingham is the prevailing quotation. Sales of special iron during the week included 900 tons of Mayari Bessemer. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace and do not include a local switching charge averaging 50c. a ton:

Lake Superior charcoal, Nos. 1, 2, 3, 4	$15.25 to $15.75
Northern coke foundry, No. 1	15.00 to 15.50
Northern coke foundry, No. 2	14.75 to 15.00
Northern coke foundry, No. 3	14.25 to 14.75
Southern coke, No. 1 foundry and No. 1 soft	15.60 to 16.15
Southern coke, No. 2 foundry and No. 2 soft	15.10 to 15.60
Southern coke, No. 3	14.60 to 15.10
Southern coke, No. 4	14.10 to 14.60
Southern gray forge	14.10 to 14.60
Southern mottled	13.60 to 14.10
Malleable Bessemer	14.75 to 15.00
Standard Bessemer	17.65
Basic	14.75 to 15.00
Jackson Co. and Kentucky silvery, 6 per cent.	18.40
Jackson Co. and Kentucky silvery, 8 per cent.	19.40
Jackson Co. and Kentucky silvery, 10 per cent.	20.40

Rails and Track Supplies.—The railroad attitude regarding purchases is unchanged and if anything more generally conservative. Prospective contracting is disappointingly slow in maturing. Rail sales of the week included 1000 tons of Mayari Bessemer rails to the Pere Marquette Railroad and 2500 tons to the Baltimore & Ohio. We now quote standard railroad spikes at 1.65c. to 1.70c., base; track bolts with square nuts, 2.10c. to 2.15c., base, all in carload lots, Chicago; tie plates, $30 to $32 net ton; standard section Bessemer rails, Chicago, 1.25c., base; open hearth, 1.34c.; light rails, 25 to 45 lb., 1.25c.; 16 to 20 lb., 1.30c.; 12 lb., 1.35c.; 8 lb., 1.40c.; angle bars, 1.50c., Chicago.

Structural Material.—The stagnation which has existed at Chicago in office building construction and in the West generally promises to be broken by the appearance of new building projects, which include, besides the Lumberman's Building, previously mentioned, a 16-story building to be erected by James O. Heyworth at Wabash avenue and Washington street, Chicago; a 16-story bank and office building for the Merchants National Bank of St. Paul, as well as a new plant of large proportions for the Starck Piano Company, Chicago. Contracts for fabricated steel placed last week included 1251 tons for a pumping station at Chicago, awarded to the Morava Construction Company, and 391 tons for Illinois Central Railroad Company Bridge at Memphis, Tenn., placed with the American Bridge Company. Prospective car business includes 1500 steel underframes for the Chicago & Great Western and 500 gondolas for the Wabash. Orders most recently placed are confined almost entirely to passenger equipment, largely for the Northwestern. Mill quotations for plain shapes have settled to the 1.30c. Pittsburgh basis for all desirable business, and we quote for Chicago delivery 1.48c. to 1.53c.

The movement of material out of store is entirely routine, the recent adjustment of prices being accepted by the trade without apparent effect. We quote for Chicago delivery 1.85c.

Plates.—Scattering specifications constitute the only business offered, with competition most pronounced in the placing of sheared plate orders. Quotations for sheared plates have declined to the open market basis of 1.25c., Pittsburgh, with universal mill plates $1 higher. For Chicago delivery from mill we quote 1.43c. to 1.48c.

For plates out of store we continue to quote 1.85c.

Sheets.—The liquidation of prices for sheets, as compared with the declines for other steel products, has been particularly pronounced. There is, therefore, a very active inquiry on the part of buyers seeking to place first half contracts on the basis of present prices. Sellers are declining to do this, and in consequence orders actually placed are reduced to minimum tonnages for promptest shipment. Prices have been stationary the past week, and quotations based on 1.95c. and 2.95c., Pittsburgh, for black and galvanized respectively continue to prevail. The mills are guaranteeing immediate rollings for special as well as standard specifications. We quote for Chicago delivery from mill: No. 10 blue annealed, 1.73c.; No. 28 black, 2.13c. to 2.18c.; No. 28 galvanized, 3.13c. to 3.18c.

Current prices on sheets out of store are given in the following quotations for Chicago delivery: No. 10 blue annealed, 2.05c.; No. 28 black, 2.65c.; No. 28 galvanized, 3.70c.

Bars.—Specifications for steel bars are pronouncedly light. Of iron bars there is a moderate tonnage in the market, and for this but one mill appears to be actively campaigning. Other mills in this territory are operating at greatly reduced schedules and the pressure on prices has been accordingly reduced. We quote for mill shipment as follows: Bar iron, 1.15c. to 1.20c.; soft steel bars, 1.43c. to 1.48c.; hard steel bars, 1.35c. to 1.40c.; shafting in carloads, 60 per cent. off; less than carloads, 55 per cent. off.

Store prices for iron and steel bars for Chicago delivery are: Soft steel bars, 1.75c.; bar iron, 1.75c.; reinforcing bars, 1.75c. base, with 5c. extra for twisting in sizes ½ in. and over, and usual card extras for smaller sizes; shafting 55 per cent. off.

Old Material.—Trading in this market has been so reduced in volume that the filling of a few small orders exhausts the outlet for some grades of scrap, the value of which immediately declines, some of the recessions being noted in the revision of quotations below. In general the market is without significance or interest. The Chicago & Alton is offering 1000 tons, and the Toledo, St. Louis & Western 800 tons of scrap. The Wabash also has a few items listed. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton.	
Old iron rails	$13.50 to $14.00
Old steel rails, rerolling	12.00 to 12.50
Old steel rails, less than 3 ft.	11.00 to 11.50
Relaying rails, standard section, subject to inspection	24.00
Old carwheels	12.00
Heavy melting steel scrap	9.50 to 10.00
Frogs, switches and guards, cut apart	9.50 to 10.00
Shoveling steel	8.75 to 9.25
Steel axle turnings	6.50 to 7.00
Per Net Ton.	
Iron angles and splice bars	12.25 to 12.75
Iron arch bars and transoms	12.25 to 12.75
Steel angle bars	8.25 to 8.75
Iron car axles	19.00 to 19.50
Steel car axles	12.50 to 13.00
No. 1 railroad wrought	9.00 to 9.25
No. 2 railroad wrought	8.25 to 8.50
Cut forge	8.25 to 8.50
Steel knuckles and couplers	9.00 to 9.50
Steel springs	9.50 to 10.00
Locomotive tires, smooth	10.50 to 11.00
Machine shop turnings	4.50 to 4.75
Cast borings	4.25 to 4.75
No. 1 busheling	7.75 to 8.00
No. 2 busheling	6.00 to 6.50
No. 1 boilers, cut to sheets and rings	6.50 to 7.00
Boiler punchings	10.25 to 10.75
No. 1 cast scrap	10.00 to 10.50
Stove plate and light cast scrap	9.25 to 9.75
Railroad malleable	9.25 to 9.75
Agricultural malleable	8.50 to 9.00
Pipes and flues	6.75 to 7.25

Rivets and Bolts.—New business in rivets is irregular, while bolt purchases are at a minimum. We quote from mill as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 80-2½; cut thread, 75-17½; larger sizes, 70-15; machine bolts up to ⅜ x 4 in., rolled thread, 80-7½; cut thread, 80-2½; large size, 75-2½; coach screws, 80-10-10; hot pressed nuts, square head, $6 off per cwt.; hexagon, $6.70 off per cwt. Structural rivets,

½ to 1¼ in., 1.98c. to 2.03c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

Out of store we quote for structural rivets, 2.70c., and for boiler rivets, 2.90c. Machine bolts up to ¾ x 4 in., 70-5-10; larger sizes, 70-7½; carriage bolts up to ⅜ x 6 in., 75-5; larger sizes, 70-7½ off. Hot pressed nuts, square head, $5.50, and hexagon, $6.20 off per cwt.

Wire Products.—The closing season of activity for many wire products is marked with increasing dullness, and the unfailing accompaniment of weakening prices is not lacking. There is little doubt that manufacturers are eager for business and the firmness of the quotation of 1.60c., Pittsburgh, for wire and wire nails, in the face of desirable contracts, is open to question. We quote to jobbers as follows: Plain wire, No. 9 and coarser, base, $1.58; wire nails, $1.78; painted barb wire, $1.78; galvanized, $2.15; polished staples, $1.78; galvanized, $2.10, all Chicago.

Cast-Iron Pipe.—Municipal lettings the past week were restricted to small tonnages. Inquiries for gas pipe have not yet begun to appear. Prices are being maintained with difficulty, and some concessions have already been made. We revise our quotations and quote as follows, per net ton, Chicago: Water pipe, 4-in., $27.50; 6 to 12 in., $25.50; 16 in. and up, $24.50, with $1 extra for gas pipe.

Philadelphia

PHILADELPHIA, PA., November 18, 1913.

Business has been in smaller volume in practically all lines. Not only has the new demand been lighter but in finished products specifications against contracts have been smaller. Mills operating at 75 to 80 per cent. of capacity a few weeks ago have fallen abruptly to about 50 per cent. In semi-finished products one prominent producer faces a shut down in the immediate future. Prices, while weak, have not materially declined, owing to the absence of any tonnage demand. Shapes are probably the strongest on the list, owing to considerable business in immediate prospect. The demand for steel billets is practically at a standstill. Hand-to-mouth buying rules in the foundry grades of pig iron. Basic is uncalled for. Sales of standard low phosphorus have been heavier, and a new price level has been established at $22 delivered in this district. Pig iron deliveries are being taken freely, but there is little disposition among consumers to get into the market for forward requirements. Coke is unchanged. Old material continues to sag, with business extremely light.

Iron Ore.—No interest is shown in the market, current deliveries being usually in excess of furnace requirements.

Pig Iron.—While new business continues light, deliveries against contracts, particularly in foundry grades, appear fully maintained and furnaces are still shipping in excess of their current make. The decrease in the consumption of steel-making grades, owing to necessary curtailments of open-hearth furnace operations in this district, may, however, result in general stock accumulations before long. Consumers continue their waiting policy, placing orders for small lots for delivery over the next 30 or 60 days or for odd lots for prompt shipment to piece out. Little interest is shown in forward supplies. The inquiry for 6000 tons of pipe-making grades, for January-February shipment, before the trade for several weeks, is still unclosed. In the higher foundry grades sales have been uniformly small, and prices, while weak, remain practically unchanged. As some producers are anxious to put tonnage on their books, there is little doubt that current quotations would be shaded for a desirable lot. With some sellers the past week's business was smaller than any week for several months. Sales of Virginia foundry iron have been mostly in small odd lots at $13 at furnace for No. 2 X and $12.75 for No. 2 plain, for either prompt or first quarter shipment. Reports that some makers would allow concessions from these prices have not been confirmed. Odd lots of Northern off-grade iron have been sold at $14.50 to $15, delivered, according to analysis. Little has been heard of the possible importation of Middlesbrough iron. Rolling-mill forge has been sold in small lots at $14.75 to $15 delivered in this district. One mill in the central part of the State is said to have purchased upward of 2000 tons at a price equal to $15, here. Outside of small and moderate lot sales of standard analysis low phosphorus pig iron, the steel-making iron market has been quiet. Standard low phosphorus was sold at $22 to $22.25, delivered in this district, establishing a basis $1 to $1.50 below recent selling prices. British hematite has been offered at $21.50 on dock, but the supply available for early delivery is said to be not over 1000 tons. Basic iron is uncalled for, and quotations are nominal. The reported sale last week of some 4000 tons of off Bessemer is confirmed. Prices varied according to analysis. The following range represents the market for small lot business, delivered in buyers' yards in this vicinity:

Eastern Pennsylvania No. 2 X foundry	$15.50 to $15.75
Eastern Pennsylvania No. 2 plain	15.25 to 15.50
Virginia No. 2 X foundry	15.80 to 16.00
Virginia No. 2 plain	15.55 to 15.75
Gray forge	14.75 to 15.00
Basic (nominal)	15.00 to 15.25
Standard low phosphorus	22.00 to 22.25

Ferroalloys.—New business has been light, with sales of 80 per cent. ferromanganese confined to odd lots for prompt and near future delivery. Consumers still withhold inquiries for next year's requirements. Quotations are unchanged at $50, seaboard, for English ferromanganese, either for prompt or forward shipment. German continues to be quoted at $49 to $49.50, seaboard. Importations during the week included 520 tons of English.

Billets.—There is almost an entire absence of demand. Not only has new business fallen off but specifications against contracts have been lighter, and some of the Eastern mills, now running well under 50 per cent., are threatened with the necessity of closing down their plants. Urgent calls for specifications have been sent out by producers to avert, if possible, this action. In the absence of business prices are nominally $22.90 for tonnage and $24 for small lots of basic open-hearth rolling billets, delivered in this district. Forging steel of ordinary analysis commands from $4 to $5 a ton over rolling billets.

Plates.—To use the expression of a large Eastern maker, "the bottom has dropped out of the plate market, at least as far as new business is concerned." Orders are confined to small odd lots, consumers not considering tonnage. Mill operations have, in instances, dropped to 45 per cent. and the outlook for increased buying, unless the railroads become active purchasers, is not favorable. For ordinary miscellaneous lots, such as make up the bulk of the purchasing, prices remain unchanged at 1.45c. to 1.50c., delivered in buyers' yards in this district, but on a good inquiry these prices would no doubt be shaded.

Structural Material.—A few contracts for several hundred tons of fabricated work have been closed, but miscellaneous buying is less active. Few contracts calling for any considerable quantity of material are being figured on in this district, although there are good prospects in sight for early next year. Prices of plain material range from 1.45c. to 1.50c., delivered here.

Sheets.—Eastern mills are gradually catching up on orders and are more dependent on day-to-day orders to keep mills at full capacity basis. For some time the sheet mills have been able to run at capacity, but the outlook for so continuing is not so favorable. Prices have a weaker appearance. No. 10 blue annealed sheets continue to be quoted at 1.65c. to 1.75c. delivered in this district.

Bars.—New business in either steel or iron bars is light. Mills are anxious for orders, but not disposed to make sharp concessions in prices. Consumers hold off awaiting developments, in the meantime placing small orders for immediate requirements. Ordinary iron bars are quoted at 1.27½c. to 1.32½c., delivered in this district, while steel bars are nominally held at 1.50c., delivered here.

Coke.—A transaction involving 7000 tons of standard furnace coke, delivery over the remainder of the year, at $1.90 at oven, represents the movement in furnace coke, although 1.85c. can be done on less well established brands. Producers still quote $2.25 at oven for early 1914 contracts, but consumers hold off. Small sales of foundry coke at $3 to $3.15 at oven are noted. The following range of prices, per net ton, is named for delivery in buyers' yards in this district:

Connellsville furnace coke	$4.00 to $4.40
Connellsville foundry coke	4.90 to 5.35
Mountain furnace coke	3.80 to 4.10
Mountain foundry coke	4.60 to 4.85

Old Material.—At present low prices for heavy melting steel several steel makers who have been depleting are showing more interest in the market, but so far without resulting in business. Consumers show little interest and business moving has not only been light but is usually done at lower prices. Transactions between dealers make up the bulk of the movement.

Heavy melting steel has been offered as low as $10, delivered, although good specification material commands about $10.50. Rolling-mill grades are particularly quiet. The following range about represents the market at which business might be done, for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates varying from 35c. to $1.35 per gross ton:

No. 1 heavy melting steel	$10.00 to $10.50
Old steel rails, rerolling (nominal)	13.00 to 13.50
Low phosphorus heavy melting steel scrap (nominal)	14.00 to 14.50
Old steel axles (nominal)	16.00
Old iron axles (nominal)	21.00
Old iron rails (nominal)	17.00
Old carwheels	12.00 to 12.50
No. 1 railroad wrought	13.00 to 13.50
Wrought-iron pipe	9.00 to 9.50
No. 1 forge fire	8.00 to 8.50
No. 2 light iron (nominal)	5.00
No. 2 busheling (nominal)	7.50 to 8.00
Wrought turnings	7.00 to 7.50
Cast borings	7.50 to 8.00
Machinery cast	12.50 to 13.00
Grate bars, railroad	9.00 to 9.50
Stove plate	9.50 to 10.00
Railroad malleable (nominal)	10.00 to 10.50

Cincinnati

CINCINNATI, OHIO, November 19, 1913.—(*By Telegraph.*)

Pig Iron.—The present market may be termed a waiting one, with both buyers and sellers holding the same attitude of indifference. Little new business is being transacted and the only redeeming feature now is the heavy shipments on contracts. Only in a few instances have requests been made to hold up shipments, and in the majority of these cases it has been ascertained that the foundries are anxious to draw on stocks on hand and clean up their yards before the coming spring season. Prices continue weak, and $13.50, Ironton, can be done on No. 2 foundry for shipment extending through the first quarter. The majority of Southern interests are asking more than the minimum prompt market quotations, and probably the general run of orders now being placed are booked above $10.50, Birmingham, for strictly No. 2 foundry grades, and this price is considered rock bottom by local agencies; in fact, a sale of 300 tons to a Central Western consumer was consummated this week on a basis of $11, Birmingham, for this year's shipment. In reality not enough business is being done to establish a market price on either Northern or Southern iron. Inquiries are scarce, and several Indiana melters are still undecided as to closing for their requirements previously made known. Competition from Lake furnaces in this immediate territory seems to have disappeared, doubtless due to inability of salesmen to get buyers interested for their future requirements. There is some demand for malleable from St. Louis territory and one inquiry from an Indiana manufacturer, both of which look promising. The silvery irons are moving slowly, with prices somewhat soft. Based on freight rates of $3.25 from Birmingham and $1.20 from Ironton we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 foundry and 1 soft	$14.25 to $14.75
Southern coke, No. 2 foundry and 2 soft	13.75 to 14.25
Southern coke, No. 3 foundry	13.25 to 13.75
Southern, No. 4 foundry	12.75 to 13.25
Southern gray forge	12.25 to 12.75
Ohio silvery, 8 per cent. silicon	18.20 to 18.70
Southern Ohio coke, No. 1	15.70 to 16.20
Southern Ohio coke, No. 2	14.70 to 15.20
Southern Ohio coke, No. 3	14.45 to 14.70
Southern Ohio malleable Bessemer	15.20 to 15.45
Basic, Northern	15.20 to 15.45
Lake Superior charcoal	16.25 to 17.25
Standard Southern carwheel	27.25 to 27.75

(By Mail)

Coke.—The market continues unsettled, with little business to report in either furnace or foundry coke. Connellsville prices are especially soft; it is stated that a few standard brands of furnace coke are obtainable around $1.80 per net ton at oven for this year's shipment. While there are reports to the contrary, it is now generally understood that only a small percentage of the furnaces in any of the producing districts has taken care of future wants. First half prices on 48-hr. brands in all three producing districts range from $2 to $2.25 per net ton at oven. Connellsville foundry coke has also been shaded, and $2.50 has been quoted for some prompt shipment business. The average for first half shipment is between $2.75 to $3.10, with but little business being transacted. Both Wise County and Pocahontas standard grades are obtainable around the same figures.

Finished Material.—Practically all mill agencies report business light, but there is no complaint as to specifications on contracts previously made. In some instances, urgent requests have been made to rush material, but this can be attributed, in a large degree, to railroad delays. The local warehouse price on steel bars is around 1.85c. and on structural shapes from 1.90c. to 1.95c. The sheet market is reported better, as far as nearby shipment is concerned, but future contracting is slow. However, the local mill is still about four to five weeks behind on orders now in hand, most of which are for small tonnages and for prompt shipment. The carload quotations on No. 28 black and galvanized sheets are firm around 2.15c. to 2.20c. for the former and 3.15c. to 3.20c. for the latter.

Old Material.—The demand from the foundries is still restricted, and the rolling mills are only taking special material that is generally contracted for at bargain prices. Yard stocks are heavy. The softening of pig-iron prices has had its effect on the scrap market. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices, f.o.b. at yards:

Per Gross Ton.

Bundled sheet scrap	$6.50 to $7.00
Old iron rails	11.00 to 12.00
Relaying rails, 50-lb. and up	19.75 to 20.25
Rerolling steel rails	11.00 to 11.50
Melting steel rails	9.25 to 9.75
Old carwheels	10.25 to 10.75

Per Net Ton.

No. 1 railroad wrought	$8.50 to $9.00
Cast borings	4.25 to 4.75
Steel turnings	4.25 to 4.75
No. 1 cast scrap	8.75 to 9.25
Burnt scrap	6.00 to 6.50
Old iron axles	16.00 to 16.50
Locomotive tires (smooth inside)	9.75 to 10.25
Pipes and flues	5.75 to 6.25
Malleable and steel scrap	6.75 to 7.25
Railroad tank and sheet scrap	4.25 to 4.75

Cleveland

CLEVELAND, OHIO, November 18, 1913.

The disastrous storm on the Great Lakes last week had the effect of entirely disarranging schedules and will cause some delay in getting down late cargoes. However, the shipping season will close next week. The storm is not expected to cause any curtailment of the season's movement as shippers will be able to ship all the ore that has been sold. One leading ore firm is already through and others have but a few cargoes coming down. We quote prices as follows: Old range Bessemer, $4.40; Mesaba Bessemer, $4.15; old range non-Bessemer, $3.50; Mesaba non-Bessemer, $3.40.

Pig Iron.—The only sales reported are a few small lots of foundry iron, and practically no inquiries are coming out. With declining prices consumers are holding off and an active buying movement for the first half may not come before the end of the year. Sellers are making no efforts to force the market, not showing any eagerness to load up their order books at the present low prices. Steel making iron is as dull as foundry grades. The local price on foundry iron, which sagged last week, is unchanged at $14 at furnace for No. 2 for Cleveland delivery, and this price would probably be quoted for delivery during the entire first half. In the Valley No. 2 foundry is quoted at $13.50 to $13.75. Southern iron is weak. No. 2 Southern is quoted at $10.50 for this year's delivery, but furnaces are still asking $11 for the first half. The local pig iron production was curtailed considerably by the storm last week. All the Cleveland furnaces but two were banked from two to five days because of an expected shortness in coke and it took a few days for the furnaces to get back to their normal output. In the case of some of the stacks the production for the month will show a falling off of 25 per cent. For delivery until January 1 we quote, delivered Cleveland, as follows:

Bessemer	$16.25
Basic	14.00
Northern No. 2 foundry	$14.25 to 14.50
Southern No. 2 foundry	14.85 to 15.35
Gray forge	14.00
Jackson County silvery, 8 per cent. silicon	18.55

Coke.—The largest sale reported is a 25-car lot of Virginia coke. Prices are stationary, but not firm. Last week's storm delayed shipment somewhat, but there are no complaints of a scarcity of furnace coke. We quote standard Connellsville furnace coke at $1.85 to $1.90 per net ton at oven for prompt shipment. Con-

nellsville foundry coke is held at $2.75 per net ton at oven.

Finished Iron and Steel.—Business is extremely quiet in all finished lines. The demand is much lighter than it should be, considering the fact that the consumption by manufacturing plants is holding up fairly well. The unusually light demand is attributed to the fact that with declining prices consumers are exhausting their stocks as rapidly as possible and are buying nothing that they do not immediately need. Plates continue to be the weakest feature in the market. While the larger mills are adhering to the 1.30c. Pittsburgh price several small mills are quoting plates at 1.20c., and a recent order for a 575-ton lot is understood to have been taken by a Cleveland mill at 1.17½c. Pittsburgh. Steel bars are quoted at 1.30c. to 1.35c. Pittsburgh, the former price being for desirable lots. There is very little demand for structural material, which is quoted at 1.35c. for small lots; a desirable order, however, would bring out a 1.30c. price. Bar iron is quoted at 1.30c. to 1.35c. Cleveland, but the demand shows little improvement. Both of the Cleveland bar iron mills have been shut down, but one was started up this week. Quotations on hard steel bars have declined to 1.30c. Sheet quotations are unchanged at 2c. for No. 28 black, 3c. for No. 28 galvanized and 1.50c. for No. 10 blue annealed. There are some inquiries for first half sheet contracts and some of the Ohio mills will make contracts for delivery extending through the first quarter at the above prices. Rivets are quoted at 1.80c. Pittsburgh for structural and 1.90c. for boiler rivets. For desirable orders, however, the former price can be shaded $1 a ton and the latter price $2 a ton. Warehouse prices are unchanged at 1.90c. for steel bars and 2c. for plates and structural material.

Old Material.—The market continues dull and weak. Quotations on heavy melting steel and busheling are lower. While most quotations are unchanged, many of these would probably be shaded to move the material. Mills are buying only odd lots for immediate delivery that are offered at very low prices. Dealers are unable to make sales for future delivery no matter how attractive prices may be. The storm last week made the dullness more pronounced as it caused a curtailment of both the production and consumption, but the delay in shipments due to the tying up of railroad traffic caused little inconvenience as consumers were in no hurry for the delivery of scrap under contract. We quote f.o.b. Cleveland, as follows:

Per Gross Ton.

Old steel rails, rerolling	$12.00 to $12.50
Old iron rails	12.50 to 13.00
Steel car axles	16.50 to 17.00
Heavy melting steel	9.25 to 9.50
Old carwheels	12.00 to 12.50
Relaying rails, 50 lb. and over	23.00 to 25.00
Agricultural malleable	9.00 to 9.50
Railroad malleable	10.50 to 11.00
Light bundled sheet scrap	6.50 to 7.00
Bundled tin scrap	11.00 to 11.50

Per Net Ton.

Iron car axles	$20.00 to $21.00
Cast borings	5.50 to 5.75
Iron and steel turnings and drillings	4.25 to 4.50
Steel axle turnings	5.75 to 6.00
No. 1 busheling	8.25 to 8.75
No. 1 railroad wrought	9.50 to 10.00
No. 1 cast	10.75 to 11.00
Stove plate	8.00 to 8.50

Good and Bad German Trade News

Tubes Advancing—Steel Bars Firmer—Other Products Lower—Looking for American Trade

BERLIN, November 6, 1913.

The position of the iron trade this week is involved in more uncertainty than previously. The Mannesmann Company at Düsseldorf has made another advance in boiler tubes of 15 to 20 marks ($3.57 to $4.76) a ton, and Thyssen and one or more of the other manufacturers have agreed not to sell below the new Mannesmann scale. In a competition for 8700 tons of steel bars, on which bids were opened several days ago by the railroad authorities at Cologne, the lowest offer made by any of the manufacturers of the Rhine-Westphalian district was 93 marks ($22.13), but their bids mostly ranged between 95 and 100 marks ($22.61 and $23.80), and a few were even higher. Offers from the Lorraine-Luxemburg were as low as 87 marks ($20.71) on cars at mill. The prices of the Rhine district give the impression that manufacturers are now disposed to hold prices at their present level, and even have hopes that they may be able to raise them. At the general meeting of the Geisweider Eisenwerke, the leading company in the Siegerland region, the general manager stated that the present prices of bars and plates are so low that they involve a loss for his establishment; for this reason it was holding off from taking business at present prices, inasmuch as there were signs that prices would rise a little before long.

There are other factors, however, which tend to indicate that the position of the trade is still growing worse. The Laurahütte, the principal company in the Silesian district, has just begun to run its rolls only four days a week; and from Esch (Luxemburg) it is reported that the great Gelsenkirchen Company has just cut down production in its iron mines by 25 per cent., with a discharge of some 200 miners. A big curtailment of production is also to be made at other mines in that district. Reductions quoted on the Düsseldorf Exchange last Friday were as follows: Bands, 5 marks ($1.19), now 117.50 to 122.50 marks ($27.97 to $29.16); heavy plates, 100 to 105 marks ($23.80 to $24.99), against 103 to 106 marks ($24.51 to $25.23); boiler plates, 110 to 115 marks ($26.18 to $27.37), against 113 to 116 marks ($26.89 to $27.37); thin plates, 117.50 to 122.50 marks ($27.97 to $29.16), against 120 to 124 marks ($28.56 to $29.51). The market tendency, as noted by the Exchange, was given as somewhat more active. Independent manufacturers of screws have reduced their prices by raising rebates 1 to 3 per cent. on screws for machinery purposes.

Seeking Outside Markets for Pig Iron

The Pig Iron Syndicate is exerting itself to increase its export business in anticipation of a reduced home demand. A Brussels dispatch announced several days ago that heavy offers of Luxemburg and German iron were being made in Belgium. A number of German companies have reduced their production of pig somewhat. It is not yet known how sales have been progressing since the Syndicate began taking orders for 1914 delivery; but it is assumed that they will be slow.

The position of the furnaces has been improved by reductions in foreign ores, especially those from Spain, the Mediterranean, and the Black Sea, owing to increased competition in ocean freights. Bilbao (Spanish) ores are now selling at 18 marks ($4.28) delivered on the Ruhr, and Santander ores at 17 marks ($4.05). While most furnacemen are deferring purchases, some large contracts have been placed. Imports of ores in October amounted to 1,206,000 tons, against 990,000 tons in the same month last year. There is talk of a probable reduction in Siegerland ores, but the mine owners are represented as being little inclined to make a lower price.

Trade Combinations

The market is much interested in the meeting of the tube manufacturers, which assembled at Düsseldorf today. According to press dispatches, the outlook for an agreement is looked upon as good, all the works recognizing the desirability of some form of combination, and an agreement having already been reached between Mannesmann and Thyssen on the main features of one. Another report, however, mentions that the Hahnsche Werke has put forward demands which the other companies flatly refused to meet. According to the same authority, the reports of movements to organize the heavy plate and the bar trade are without any foundation, there having been no discussions of the matter among the makers. The movement to organize the wire-nail trade is also regarded as abandoned.

Trade in steel castings is represented as being still very active. The foundries are well employed, and are demanding rather long periods in which to fill orders. Home buyers, indeed, are rather reserved, but foreign markets are still sending in good orders. The prospects for the future are variously judged among producers, but most of them expect active business next spring.

Looking Toward the United States

At a meeting yesterday of the Verein Deutscher Eisen und Stahlindustrieller the chairman referred in his address as follows to the outlook for German manufacturers finding an opening in America under the new tariff: "The most important event in the sphere of foreign tariffs is the new tariff law of the United States. . . . So far as the duties themselves are concerned, they have in part been so reduced that a well-founded prospect for a revival of the German export trade exists. The customs administrative features, however,

present ground to misgivings. . . . Whether the German iron and steel industry shall at last find a foothold in the United States will depend in the main upon what measures the American steel industry adopts as to prices. If prices are sharply reduced at points near the seaboard, as is already reported as being planned for the Pacific coast, this would diminish the prospects of the German trade finding a new market."

Birmingham

BIRMINGHAM, ALA., November 17, 1913.

Pig Iron.—If Birmingham district furnace operators are in any instance selling under a minimum of $11.25, there is nothing here to show it. Brokers who have purchased small lots state that $11.25 is the best they have been able to do. Operators deny any concessions and allege that if there have been any sales around $11 it must have been resale merchant iron or that of Tennessee or extreme northern Alabama furnaces which may have sacrificed the freight differential. The special Clifton brand has been sold in the past week at $12.50 and $13, the lower price being for 1500 tons and the higher for 100 tons. This brand sells at $1 to $1.50 above ordinary foundry. It was Southern business. It is admitted that there are points of competition where, if business is done, it must be at a lower level, but it is also claimed that in the present state of order books and owing to the demand existing in Southern non-competitive territory, there is as yet no necessity to cut prices. A leading furnaceman said: "Here and there you may find a merchant or someone else who is willing to take as low as $11 for iron, but as a rule I think the Birmingham district operators are not inclined to sacrifice their iron. We are too close to cost of manufacture to consider any marked recession." One large furnace operator has sold his make so far this month, bookings of 15,000 tons having been made prior to the middle of the month. Representatives of the leading pipe interests have been in the South recently, but no furnaceman admits having sold them. Business booked for 1914 is still comparatively small. When a real 1914 buying movement sets in, the future of the market will be determined, but not before. The Woodward Iron Company is credited with bookings covering its output for four months ahead. We quote, per gross ton, f.o.b. Birmingham district furnaces (the lower figures representing the minimum price brokers declare they have secured), as follows:

No. 1 foundry and soft	$11.75 to $12.00
No. 2 foundry and soft	11.25 to 11.50
No. 3 foundry	10.75 to 11.00
No. 4 foundry	10.50 to 10.75
Gray forge	10.25 to 10.50
Basic	11.00 to 11.25
Charcoal	23.50 to 24.00

Cast-Iron Pipe.—Improvement is noted in the pipe trade, and there is prospect of an increasing business. The feature of the month was the shipment of 4500 tons of pipe from the United States Cast Iron Pipe & Foundry Company's plants at Bessemer and Anniston to Panama. A continuance of this business for the Government seems assured for some time and in considerable quantities. Plants are operating as previously and shipments are equal to the make. We quote f.o.b. works as follows: 4-in., $22; 6-in. and upward, $20, with $1 added for gas pipe.

Old Material.—Dealers report some activity and satisfactory sales. They are beginning to take on additional stocks. Quotations are nearer being realized in actual trading. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old iron axles (light)	$15.00 to $15.50
Old steel axles (light)	15.00 to 15.50
Old iron rails	12.50 to 13.50
No. 1 railroad wrought	12.00 to 12.50
No. 2 railroad wrought	10.00 to 10.50
No. 1 country wrought	9.50 to 10.00
No. 2 country wrought	8.50 to 9.00
No. 1 machinery cast	10.00 to 10.50
No. 1 steel scrap	10.50 to 11.00
Tram carwheels	10.50 to 11.00
Standard carwheels	12.00 to 12.50
Light cast and stove plate	8.50 to 9.00

Coal and Coke.—Steam coal is reported duller than it has been at this time of the year in several seasons. A number of mines are working half time. Some scarcity of cars is reported. Railroads are loaded up with coal, and the mild winter of 1912-13 is having its effect. No recessions in prices are reported. Coke is also seeking an outlet for the quantity manufactured and is not as high as it was a few weeks ago. The inquiries from the Western smelters have not yet produced business. J. C. Maben, president of the Sloss-Sheffield Steel & Iron Company, announces that his company will build 300 bee-hive ovens to take the place of the Birmingham plant which is to be abandoned January 1. We quote, per net ton, f.o.b. oven, as follows: Furnace coke, $2.75 to $3; foundry, $3.50 to $4.

Sharp Break in British Ship Steel

India and Japan Inquiring for Bars and America for Billets and Cotton Ties

(*By Cable*)

LONDON, ENGLAND, November 19, 1913.

There is no improvement in tone and prices are generally lower. Steel makers have again reduced shipbuilding steel by 10s. and have abandoned their rebate scheme. India and Japan are inquiring more freely for basic bars. The United States has bought a few billets and cotton ties and is inquiring moderately for semi-finished and finished steel. Stocks of pig iron in Connal's stores are 152,804 tons against 155,892 tons a week ago. We quote as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 12s. 9d. ($3.10).

(The following prices are per ton of 2240 lb.):

Cleveland pig-iron warrants (Tuesday) 48s. 10d. ($11.87), against 49s. 6d. ($12.03) one week ago.

No. 3 Cleveland pig iron, makers' price, f.o.b. Middlesbrough, 49s. 3d. ($11.97), against 50s. ($12.15) one week ago.

Ferromanganese, £9 17s. 3d. ($48).

Steel sheet bars (Welsh), delivered at works in Swansea Valley, £4 15s. ($23.11).

Steel bars, export, f.o.b. Clyde, £6 5s. ($30.48).

Steel joists, 15-in., export, f.o.b. Hull or Grimsby, £5 17s. 6d. ($28.59).

Steel ship plates, Scotch, delivered local yards, £6 7s. 6d. ($31.03), against £7 7s. 6d. ($35.89) one week ago.

Steel black sheets, No. 28, export f.o.b. Liverpool, £9 ($43.79).

Steel rails, export, f.o.b. works port, £6 7s. 6d. ($31.02).

(The following prices are per export ton of 1015 kilos, equivalent to 2237.669 lb.):

German sheet bars, f.o.b. Antwerp, 77s. ($18.73).

German 2-in. billets, f.o.b. Antwerp, 80s. ($19.46).

German basic steel bars, f.o.b. Antwerp, £4 11s. ($22.13), against £4 11s. 4d. to £4 12s. ($22.22 to $22.38) one week ago.

German joists, f.o.b. Antwerp, £5 5s. to £5 8s. ($25.55 to $26.28).

St. Louis

ST. LOUIS, MO., November 17, 1913.

The market has been marking time. Prices are not being held very steadily, but at the same time there are no pronounced developments of weakness.

Pig Iron.—Furnace representatives, though not yet with authority to make materially lower quotations, are submitting freely the offers of prospective purchasers with more hope that they will be accepted. While there are reports of transactions below $11 per ton, Birmingham basis, for No. 2 Southern foundry, these cannot be verified. Practically no requests are being made to hold back quotas. Inquiries have been confined to small lots, for the most part filled immediately on the quotation response. Two inquiries which remain are for 500 tons of No. 1 soft Southern and 2400 tons of No. 2 and No. 3 for stove making use, both awaiting apparently further price concessions.

Coke.—There is pronounced weakness and this without business coming at the lower prices. Sales have been made of the small lot order, on which naturally better prices have obtained than would rule in the case of transactions of any size. By-product coke is on a basis of the Connellsville product.

Finished Iron and Steel.—There has been keener competition among salesmen, but without increase in the bookings. Structural material is moving forward freely on contracts, but there is no disposition to contract ahead. The market is on a basis of 1.35c., but keen competition for a large order would develop a lower price. Bars, both reinforcing and ordinary, are

in good demand with prices well held in comparison with other products.

Old Material.—In the scrap market there has been so little doing as scarcely to establish prices, except for a revival in relaying rails, and these are proving hard to get except at advanced prices. In general list prices are lower than ever and dealers are not doing any business even then, except that they are picking up a few attractive lots which come to them at prices which seem likely to justify laying down in the yards to await the development of better times. The steel foundries and rolling mills are not taking any material and are even in some instances trying to cancel contracts or at least arrange postponements. We quote dealers' prices, f.o.b. St. Louis, as follows:

Per Gross Ton.	
Old iron rails	$10.00 to $10.50
Old steel rails, re-rolling	11.00 to 11.50
Old steel rails, less than 3 ft	8.50 to 9.00
Relaying rails, standard section, subject to inspection	22.50 to 23.50
Old carwheels	10.00 to 10.50
Heavy melting steel scrap	8.00 to 8.50
Shoveling steel	7.50 to 8.00
Frogs, switches and guards cut apart	8.00 to 8.50
Per Net Ton.	
Iron angle bars	$9.00 to $9.50
Steel angle bars	7.00 to 7.50
Iron car axles	16.50 to 17.00
Steel car axles	10.00 to 10.50
Wrought arch bars and transoms	10.00 to 10.50
No. 1 railroad wrought	7.50 to 8.00
No. 2 railroad wrought	7.00 to 7.50
Railroad springs	7.00 to 7.50
Steel couplers and knuckles	7.00 to 7.50
Locomotive tires, smooth	9.00 to 9.50
No. 1 dealers' forge	7.00 to 7.50
Mixed borings	2.00 to 2.50
No. 1 busheling	6.50 to 7.00
No. 1 boilers, cut to sheets and rings	3.00 to 3.50
No. 1 cast scrap	7.50 to 8.00
Stove plate and light cast scrap	6.00 to 6.50
Railroad malleable	6.50 to 7.00
Agricultural malleable	6.00 to 6.50
Pipes and flues	4.00 to 4.50
Railroad sheet and tank scrap	3.00 to 3.50
Railroad grate bars	5.50 to 6.00
Machine shop turnings	3.00 to 3.50
Bundled sheet scrap	3.50 to 4.00

San Francisco

SAN FRANCISCO, CAL., November 11, 1913.

Some further foreign business has been done, and there is increasing evidence of prospective competition between foreign and American manufacturers. Notwithstanding reductions already made by the latter, it is expected that a much more serious effort to meet foreign prices will be made before any heavy tonnage of imported material arrives. Owing to the risk attending import shipments, time required and other disadvantages, local buyers are disposed to favor American steel, even at slightly higher prices. Pending a further readjustment of prices, however, importers are getting considerable business, and there is talk of more foreign mills seeking connections here. Several factors tend to retard the placing of orders with American mills, namely, the prospect of lower freight rates, both by land and water; the approach of inventory time, and the continued weakness in primary markets. Hence it is doubtful whether any large buying will be done until well along in the first quarter. A reasonable curtailment is noted in jobbing trade. Resale prices have been cut on galvanized sheets and pipe.

Bars.—Further concessions from Eastern mills are expected at any time. With foreign bars offered in large lots at 1.50c., it is believed that a price of 1.60c. on domestic material would hold the bulk of the business, but a large tonnage of foreign material has already been booked. Current orders are mostly for prompt delivery from store, and are limited to the most urgent requirements. Distributive business in soft steel bars holds up fairly well for this time of year, though somewhat lighter than a month ago, the resale price being maintained at 2.25c., with the usual differential on iron. Local mills report a moderate tonnage of reinforcing material at 2c. for open-hearth bars.

Structural Material.—No fabricating contracts of importance have been closed for some time, and conditions as indicated by the October records are not satisfactory, the valuations for San Francisco, Los Angeles and Portland, Ore., showing a marked decrease from a year ago. There is a good tonnage in prospect, however, as contracts are expected soon on a number of projects formerly mentioned, and several new inquiries are coming out. New figures will be taken November 28 for the Exposition entrance tower. The Los Angeles wharf job amounts to about 1500 tons. Plans are about ready for an addititon to the Crocker building and work will start early next year on a large hospital for the University of California. Figures are now being taken for a building at Stanford University, about 250 tons. Plans are under way for a large steel frame building for the Bishop estate at Honolulu. A five-story building on south Hill street, Los Angeles, is coming up shortly, and preliminary arrangements are being made for another office building at Fresno. It is reported that a 10-story class A building will be erected at Seventeenth street and Telegraph avenue, Oakland, and the Oakland Chamber of Commerce is promoting a building project for Thirteenth and Harrison streets. The situation as to prices for plain material stands about as before, foreign shapes being available for winter delivery at about 1.70c., and American at 2c., from store, though there is still some uncertainty as to values. Contracts have been placed by numerous fabricators for a considerable tonnage of foreign shapes.

Rails.—Current business is limited to very small orders, as efforts to finance important extensions have so far met with little success. There is a good deal of tentative figuring, however, and some fairly important orders are expected early in 1914. A lot of material will soon be required for municipal street railroads.

Plates.—Construction contracts have recently come out requiring a fair tonnage, but the quantity actually booked is limited, as jobbers are holding off and most manufacturers are well covered for present requirements. Tank and pipe business is dull, but preliminary figures are being taken on a large amount of work for spring. Agents for foreign mills are actively soliciting business at about 1.70c., but apparently with only moderate success.

Sheets.—Following continued recession of prices in primary markets, the local resale price of galvanized sheets has been cut sharply, and values at present are unsettled. The cut has failed to bring out any notable increase of business from consuming trades, and stocks are said to be light.

Standard Pipe.—Some cutting is reported in the local market, the few merchants who have any considerable stock on hand being anxious to sell. Merchants and mill agents report little business. There has been some talk of foreign pipe accounts being taken up here, but nothing definite has developed so far, and no serious foreign competition is expected except in a few special lines.

Cast-Iron Pipe.—The Southern Pacific Railroad has ordered 2000 tons for delivery in Utah. Aside from this, little business has been closed, but there is a fair tonnage in prospect. In addition to the Riverside inquiry, the city of Portland, Ore., is expected in the market in January for about 11,000 tons. The city of Los Angeles is taking figures on valves for the Tahuenga pipe line.

Pig Iron.—In the absence of any business of importance, local prices are little more than nominal, and it is impossible to give a definite quotation on foreign iron. Two moderate lots of European iron have arrived lately, but receive no attention from melters, whose limited requirements are fairly covered. Agents for Southern furnaces are asking $23 to $23.50 per gross ton for No. 1 foundry, first quarter, but are getting no business.

Coke.—A rather heavy tonnage has arrived lately, but there is practically no demand for coke, either on the spot or in transit, most buyers having fully covered their requirements earlier in the season. Values show no further change, German Syndicate coke being held at $13 to $14 per net ton, ex yard, or $11 to $11.50 per gross ton to arrive.

Old Material.—Foreign competition in the bar market has forced important concessions on the lines of scrap used by local mills, and consumers report large purchases direct from the original owners at about $8 per gross ton for steel melting scrap and $9 to $10 for melting rails. The movement in other lines is holding up fairly well. Dealers quote cast-iron scrap, per net ton, at $17 to $18; wrought scrap, per net ton, $13 to $15; rerolling rails, per net ton, $15 to $16.

W. A. Taylor, California representative of the La Belle Iron Works, has taken the tin plate account of the Wheeling Sheet & Tin Plate Company.

The American Steel Bar Mfg. Company, San Francisco, has been incorporated with a capital stock of $50,000 by W. B. Hinchman, N. B. Ellery, E. J. Bartholomew, F. M. Doak and G. H. Deane.

Buffalo

BUFFALO, N. Y., November 18, 1913.

Pig Iron.—Most producers report light inquiry and small placement. Users are cautious and conservative. The week's inquiry, however, includes one or two requests for 1000 and 1500 ton lots and one of 2500 tons foundry grades; also two or three small lots of malleable. One large producer reports the booking of considerable business at prices slightly under current schedules, mostly for nearby delivery. The aggregate sales for the week amounted to nearly 8000 tons of all grades. In sharp contrast to the quiet in new business is the active demand for quick shipments on existing contracts. As an illustration of the rushing forward of deliveries on contracts it can be stated that one large local producing interest shipped out in one day during the past week 50 cars of the large modern type and five canal boats loaded with various grades of pig iron, which is a record day's shipment for that company, and each day's shipments for the week averaged high. The melt of many foundries is heavier than anticipated and many foundries are now running on very close stock margins. No. 1 iron is being quoted by one interest at $14 at furnace and it is reported that one fairly good sized tonnage of gray forge was taken at $13.50 at furnace. The price schedule is not as well defined as to grades as for the previous week, but the following fairly represents the market for delivery, f.o.b. furnace, for 1913 and first quarter 1914 delivery:

No. 1 foundry	$14.00 to $14.50
No. 2 X foundry	13.75 to 14.00
No. 2 plain	13.50 to 13.75
No. 3 foundry	13.25 to 13.50
Gray forge	13.50
Malleable	14.00
Basic	14.25 to 14.50
Charcoal	15.50 to 16.50
Charcoal, special grades	17.00 to 19.50

Finished Iron and Steel.—It is a hand-to-mouth buying and practically every order is for immediate shipment. The number of inquiries is increasing, but they appear to represent the evening up of stocks. Steel bar prices have reached a point where 1.35c. seems to be the top of the market, with the probability that 1.30c. can be done on desirable specifications and the same for structural material with plates at 1.30c. as the general price with the possibility of shading that figure on desirable tonnages. There is a growing feeling that prices will not reach the low level they touched two years ago. Contracts continue to be placed for tin plate on the 3.40c. basis, buyers believing that the price is established upon bottom prices for pig tin and sheet bars and does not afford much latitude for further shrinkage, but rather a possibility of advancing should pig tin advance. Sheets both black and galvanized are in fairly active demand but at somewhat easier prices. In wire and wire products the market is no stronger and the attitude of buyers is to wait for lower prices. Reports from some quarters indicate that the price on wire nails is now off $7 per ton. In fabricated structural material the lower level of prices reached has had the effect of bringing about some new business, principally of small tonnage. The Lackawanna Bridge Company has 600 tons for pier work for the Pennsylvania Railroad in New York City and the American Bridge Company has two Erie Barge Canal bridges aggregating 600 tons. Bids are being taken for 500 tons and about 1000 tons of concrete reinforcing bars for a new elevator for the Husted Milling Company, Buffalo, and figures will also soon be taken on the 13-story elevator to be erected by the Clover Leaf Milling Company requiring a large tonnage of shapes and bars. The George Kellogg Structural Company, Buffalo, has the steel for foundry and machine shop for the Foote Mfg. Company, Nunda, N. Y.; for addition to the Phoenix Brewery, Buffalo; school building for Church of Our Lady of Lourdes, and for the Agronomy Building and stock judging pavilion at Cornell University, Ithaca, totaling in all 675 tons.

Old Material.—Very little business is being transacted. Some heavy melting steel is still going to Pittsburgh and eastern Pennsylvania districts, but at low figures. Prices in all lines have a sagging tendency, owing to the light demand; but most dealers are not inclined to consider the low prices which would have to be made to secure business. The following schedule, though largely nominal, represents the market as closely as possible, per gross ton, f.o.b. Buffalo:

Heavy melting steel	$9.75 to $10.50
Boiler plate, sheared	11.50 to 12.00
Bundled sheet scrap	6.50 to 7.00
No. 1 busheling scrap	9.00 to 9.50
No. 2 busheling scrap	7.00 to 7.50
Low phosphorus steel scrap	16.50 to 17.00
Iron rails	15.00 to 15.50
No. 1 railroad wrought	12.00 to 12.50
No. 1 railroad and machinery cast scrap	12.00 to 12.50
Steel axles	17.00 to 17.50
Iron axles	22.50 to 23.00
Car wheels	11.75 to 12.25
Railroad malleable	11.00 to 11.50
Locomotive grate bars	9.50 to 10.00
Stove plate (net ton)	9.75 to 10.00
Wrought pipe	8.50 to 9.00
Machine shop turnings	5.00 to 5.50
Heavy steel axle turnings	8.00 to 8.75
Clean cast borings	5.50 to 6.00

Louis Sukernek, dealer in scrap iron and metals, Buffalo, with extensive yards at Clinton street and the New York Central Railroad, has filed a petition in bankruptcy with liabilities of $225,000 and assets $85,000. The principal creditors are scrap dealers in Chicago, New York and Pittsburgh districts. Solomon Ginsberg and H. F. Bingham, Buffalo, have been appointed trustees in bankruptcy.

Boston

BOSTON, MASS., November 18, 1913.

Old Material.—Dealers find little change in the market. Buying is from hand to mouth, with prices unchanged. The quotations given below are based on prices offered by the large dealers to the producers and to the small dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points which take Boston rates from eastern Pennsylvania points. In comparison with Philadelphia prices the differential for freight of $2.30 a ton is included. Mill prices are approximately 50c. a ton more than dealers' prices.

Heavy melting steel	$8.25 to $8.50
Low phosphorus steel	13.75 to 14.75
Old steel axles	13.75 to 14.75
Old iron axles	21.25 to 21.75
Mixed shafting	13.25 to 13.50
No. 1 wrought and soft steel	10.00 to 10.25
Skeleton (bundled)	6.50 to 7.00
Wrought-iron pipe	8.00 to 8.25
Cotton ties (bundled)	7.00 to 7.25
No. 2 light	3.75 to 4.25
Wrought turnings	4.50 to 5.00
Cast borings	5.00 to 5.25
Machinery, cast	11.25 to 11.50
Malleable	8.00 to 8.25
Stove plate	7.75 to 8.00
Grate bars	6.25 to 6.50
Cast-iron carwheels	12.00 to 12.25

New York

NEW YORK, November 19, 1913.

Pig Iron.—Inquiries for forward delivery are in hand involving considerable tonnage, but they are of an uncertain character and fail to inspire confidence among sellers that they will develop into orders at a reasonably early date. Business for prompt shipment has been somewhat better, with sales reported of a good number of small lots, while one transaction involved 1000 tons. Urgent requests for prompt shipment, which have been a feature of the pig-iron trade for some time, continue to be received, indicating that stocks in consumers' yards are low and that the iron ordered is imperatively needed. It is felt that each passing week brings the time definitely nearer when a buying movement of some proportions will be experienced. While the price of pig iron is steadily falling in Europe, prices are also giving way on this side, so that importations along the Atlantic seaboard are still deferred. We quote Northern iron for tidewater delivery as follows: No. 1 foundry, $15.50 to $15.75; No. 2 X, $15.25 to $15.75; No. 2 plain, $15 to $15.25. Southern iron is quoted at $15.25 to $15.75 for No. 1 foundry and $14.75 to $15.25 for No. 2.

Finished Iron and Steel.—Sellers are notably cheerful, in spite of continued dullness, and they take every occasion to decry calamity howling, which they ascribe to unwarranted pessimism in financial circles. The New York market continues to reflect soft tendencies elsewhere, and generally speaking quotations are modified with an admission that concessions are undoubtedly obtainable with orders of any size. There is of course quite a fair amount of business moving, and the indications of its volume may be had from the report of larger awards noted below. There are practically no

new structural projects up for figuring, but it is understood that a building for Vassar College, involving a round tonnage, will again be up shortly for estimates and 6500 tons have been added to the New York subway work yet to be closed, some 90,000 tons in all, on account of the readvertisement for tenders December 2 of a section on which bids have been rejected. New railroad car inquiries are elusive, about the only one being for 12 coaches for the New York, Ontario & Western and 10 passenger cars for the Soo. The business which has been settled includes: 1250 tons for a high school building, Springfield, Mass., to the Levering & Garrigues Company; about 700 tons for the Kanawha National Bank, Charleston, W. Va., to the Potthoff Construction Company, using Bethlehem steel; 450 tons for addition to the Palais Royal, Washington, to Detrich Brothers; 425 tons for the Y. M. C. A., Hartford, to the Berlin Construction Company; 250 tons for platform canopies, New York Central, to Lewis F. Shoemaker & Co., who have also taken 200 tons for the New Haven, and 300 tons has also been closed for highway and signal bridges, New York Central. The late settlements in car buying include: 500 hopper cars to the Pressed Steel Car Company and 200 gondolas to the Cambria Steel Company, all for the Lehigh & New England; 1100 underframes to the Louisville & Nashville, 800 to the Mount Vernon Car Mfg. Company and 300 to the American Car & Foundry Company, which has also taken 500 hopper car bodies for the Wabash. It is probable that the Haskell & Barker Car Company has closed with the Peabody Coal & Coke Company for 250 cars, and an unconfirmed sale may be noted of 1000 freight cars by the Standard Steel Car Company and 100 passenger cars by the Pullman Company, both for the Lehigh Valley. We quote mill shipments of plain material and bars at 1.30c., Pittsburgh, or 1.46c., New York, and steel plates at 1.25c., Pittsburgh, though it is reported that a local jobber has closed at 1.20c., Pittsburgh, for plates, or at any rate has received a quotation of 1.22½c. Pittsburgh. Bar iron is lower and we quote for refined iron 1.30c. to 1.40c., New York. Store prices have also been revised and iron and steel bars are now obtainable at 1.90c. to 1.95c. and shapes and plates at 1.95c. to 2c.

Cast-Iron Pipe.—Belleville, N. J., opens bids today on 167 tons of 6's and 8's. This appears to be about the only public letting in this locality. General business is seasonably quiet, although a little more inquiry is noted for spring delivery with the probability that sharp buyers may endeavor to take advantage of present dull conditions to make favorable contracts for their next season's requirements. Quotations are continued at $23 to $23.50 per net ton, tidewater, New York, on carload lots of 6 in.

Ferroalloys.—Consumers of ferromanganese and ferrosilicon are purchasing only for their immediate needs, and consequently the market is dull. Quotations remain the same as last week, the price for 80 per cent. ferromanganese being $50, Baltimore, while 50 per cent. ferrosilicon is to be obtained at $75, Pittsburgh, for carloads; $74 for 100 tons and $73 for 600 tons or over.

Old Material.—No improvement in demand is shown, and prices continue to recede. Dealers having contracts with consumers are experiencing much difficulty in making deliveries, as rejections are heavy. The lack of inquiry is especially noteworthy. Consumers do not appear to be in need of old material, and the small volume of business now current is wholly due to pressure to sell by holders. Quotations are as follows, per gross ton, New York:

Old girder and T rails for melting	$7.75 to $8.25
Heavy melting steel scrap	7.75 to 8.25
Relaying rails	20.50 to 21.00
Rerolling rails	11.00 to 11.50
Iron car axles	20.00 to 21.00
Steel car axles	13.50 to 14.00
No. 1 railroad wrought	10.75 to 11.25
Wrought iron track scrap	9.75 to 10.25
No. 1 yard wrought, long	9.25 to 9.75
No. 1, yard wrought, short	8.25 to 8.75
Light iron	3.00 to 3.50
Cast borings	4.50 to 5.00
Wrought turnings	4.25 to 4.75
Wrought pipe	7.50 to 8.00
Carwheels	11.00 to 11.50
No. 1 heavy cast, broken up	11.00 to 11.50
Stove plate	7.75 to 8.25
Locomotive grate bars	7.25 to 7.75
Malleable cast	8.00 to 8.50

Crocker Brothers, Forty-second Street Building, New York, announce that they have recently been appointed exclusive agents for the sale of Oriskany foundry iron made by the Oriskany Ore & Iron Corporation, Lynchburg, Va.

Metal Market

NEW YORK, November 19, 1913.

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York			Lead		Spelter	
Nov.	Lake.	Electrolytic.	Tin, New York.	New York.	St. Louis.	New York.	St. Louis.
13	16.00	15.37½	39.95	4.35	4.20	5.30	5.15
14	16.00	15.37½	40.00	4.35	4.20	5.30	5.15
15	16.00	15.37½	.....	4.35	4.20	5.30	5.15
17	16.00	15.25	39.80	4.35	4.20	5.30	5.15
18	16.00	15.25	40.15	4.35	4.20	5.30	5.15
19	16.00	15.25	40.15	4.35	4.20	5.30	5.15

Copper has continued to decline and in electrolytic a fair but not normal business has been done. Tin has advanced under improved demand and concentration of supply. Lead is a trifle weaker. Spelter is dull. Antimony is unchanged.

New York

Copper.—The market has continued to sag and on Monday quotations were 15.25c. for November and December delivery and 15.12½c. for January and February. At these prices a fair business was done, chiefly for export, although domestic consumers also purchased. Compared with what had been doing the movement was good, inasmuch as probably 10,000,000 to 15,000,000 lb. was bought, but whatever the quantity which was taken, it is not considered normal in view of the fact that both Europe and America are not covered far ahead. At 15.25c. some but not all first hands were sellers. The price of 15.12½c. for January and February was made by second hands. The Lake companies are not naming any price whatever, but will do so in the near future and it will be on a lower level, of course. In view of all the circumstances 16c. may be considered a fair estimate of the normal point at which Lake is hanging at this time. Electrolytic is quoted to-day at 15.25c. but cannot be termed strong at that figure, for despite the improved buying of this week most consumers are still holding aloof and the general situation has changed but little. London quotations to-day are £68 10s. for spot and £67 for futures. The spot price abroad advanced £1 15s., but this is attributed to local speculation and had little or no effect upon New York prices. Copper exports this month total 16,985 tons.

Pig Tin.—The better demand for small lots which existed last week continued until yesterday when it fell off sharply, presumably because pressing demands had been satisfied. The buying was stimulated by a realization that the supply of the metal is not only over large but also not widely distributed. The strong statistical position caused dealers to buy all the stray lots they could find. As a result a great deal of spot and November tin is concentrated in the hands of two concerns who are more or less in a position to dictate prices. In the past few days the premium above the import cost has ranged between $3 and $5 a ton. The quotation to-day is 40.15c. In London £181 15s. is asked for spot and £182 15s. for futures. Arrivals this month total 1427 tons and there is afloat 2445 tons.

Lead.—There has been no change except that the market is slightly easier. Quotations are 4.35c., New York, and 4.20c., St. Louis, but it is probable that an offer of 4.17½c., St. Louis, would be accepted for a desirable order.

Spelter.—The quiet conditions previously reported are without change. The market is 5.30c., New York, and 5.15c., St. Louis, with a strong probability that these prices might be shaded a little if it would produce business.

Antimony.—Quotations are without change at or near 7.25c. for Hallett's, 7.50c. for Cookson's and 6.25c. for Chinese and Hungarian grades. The tariff question in regard to this metal is by no means settled as importers and the customs officials have been unable to agree on a mutually satisfactory basis of valuation. Some of the former are paying an excess duty pending a final settlement.

Old Metals.—Prices have again declined. Dealers are quoting to sell as follows:

	Cents per lb.
Copper, heavy and crucible	14.75 to 15.00
Copper, heavy and wire	14.25 to 14.50
Copper, light and bottoms	13.00 to 13.25
Brass, heavy	9.25 to 9.50
Brass, light	8.00 to 8.25
Heavy machine composition	13.00 to 13.25
Clean brass turnings	8.25 to 8.50
Composition turnings	11.50 to 11.75
Lead, heavy	4.[illegible]
Lead, tea	3.85
Zinc, scrap	4.15

Chicago

NOVEMBER 17.—Copper quotations declined sharply the past week, largely because of the restriction of sales for future delivery. Transactions for spot shipment are up to the average volume. We quote as follows: Casting copper, 16.25c.; Lake copper, 16.75c., for prompt shipment; small lots, ¼c. to ⅛c. higher; pig tin, carloads, 40.50c.; small lots, 42.50; lead, desilverized, 4.30c. to 4.35c., and corroding, 4.45c. to 4.60c. for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 5.20c.; Cookson's antimony, 9.50c.; other grades, 8c.; sheet zinc, $7.50, f.o.b. La Salle or Peru, Ill., less 8 per cent. discount in carloads of 600-lb. sacks. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 14c.; copper bottoms, 12.50c.; copper clips, 13.25c.; red brass, 12.50c.; yellow brass, 9c.; lead pipe, 3.75c.; zinc, 3.75c.; pewter, No. 1, 25c.; tin foil, 32.50c.; block tin pipe, 33c.

St. Louis

NOVEMBER 17.—There has been a light demand, with a tendency toward recession. Lead is now quoted at 4.20c.; spelter, 5.17½c.; Lake copper, 16.85c.; electrolytic copper, 15.60c. to 15.85c.; tin, 40.25c. to 40.45c.; Cookson's antimony, 7.95c. In the Joplin ore market a weaker feeling has prevailed and zinc blende has ranged from $40 to $43 for 60 per cent. with the top settlement at $46. Calamine shows little change, ranging from $20 to $22 for 40 per cent., while the premium grades brought as high as $26. Lead ore was $52 for 80 per cent. On miscellaneous scrap metals we quote as follows: Light brass, 6c.; heavy brass and light copper, 10.50c.; heavy copper and copper wire, 12c.; pewter, 24c.; tinfoil, 30c.; zinc, 2.75c.; tea lead, 2.75c.; lead, 3c.

Iron and Industrial Stocks

NEW YORK, November 19, 1913.

The better aspect to our Mexican relations imparted by the frank announcement of the British Government to abide by the policy of the United States caused a strengthening of security values. Although the transactions of the week have been light most prices have shown an advance. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week has been as follows:

Allis-Chalmers, com.	8 - 8¼	Pittsburgh Steel, pref.	90
Allis Chalmers, pref.	42	Pressed Steel, com.	25
Am. Can, com.	26¾- 29⅞	Pressed Steel, pref.	94¼
Am. Can, pref.	88 - 91½	Republic, com.	18½- 19
Am. Car & Fdy., com.	43 - 43½	Republic, pref.	79 - 80
Am. Car & Fdy., pref.	112 -112½	Rumely Co., com.	16½- 17
Am. Loco., com.	29 - 29¾	Rumely Co., pref.	41 - 43
Am. Loco., pref.	96⅞- 97	Pipe, pref.	43
Bald. Loco., com.	39	U. S. Steel, com.	54½- 56¼
Bald. Loco., pref.	104½	U. S. Steel, pref.	104¾-105½
Beth. Steel, com.	28½- 29½	Va. I. C. & Coke	40
Beth. Steel, pref.	69	Westinghouse Elec.	65 - 66
Case (J. I.), pref.	94 - 95	Am. Ship, com.	28 - 31
Colorado Fuel	26¼- 27¼	Am. Ship, pref.	81 - 85
Deere & Co., pref.	96½- 97¼	Chic. Pneu. Tool	51 - 51½
General Electric	139½-140½	Cambria Steel	47 - 48⅛
Gr. N. Ore Cert.	31 - 32⅛	Lake Sup. Corp.	22¾
Int. Harvester, com.	103	Pa. Steel, pref.	64
Int. Harvester, pref.	112¼-113	Crucible Steel, com.	15½- 16
Int. Pump, com.	5⅛- 6	Crucible Steel, pref.	89¾- 90⅛
Int. Pump, pref.	18	La Belle Iron, com.	40
Nat. En. & St., com.	10¼- 10⅞		

Dividend Declared

The Harbison Walker Refractories Company, regular quarterly, ½ of 1 per cent. on the common stock, payable December 1.

According to I. R. Bailey, manager of the mechanical goods department of the Goodyear Tire & Rubber Company, Akron, Ohio,, that department is making rapid progress, considering that it has been in existence less than a year. There has just been completed a 36-in. 8-ply rubber conveyor belt 1100 ft. long and weighing 13,360 lb. In September the belt department made 73,750 ft. of rubber belting, of a total weight of 104,035 lb. The hose department is turning out 30,000 ft. of garden hose daily, and the air-brake hose department, which began operations in October, is also turning out large quantities of corrugated tender and car-heating hose.

The property of Milliken Brothers, Inc., Staten Island, N. Y., was not sold November 11 as advertised, the sale having been adjourned until December 2 by order of the United States District Court.

Domhoff-Joyce Employees Meet

The employees in the executive and sales departments of the Domhoff & Joyce Company, pig and coke iron merchant, with headquarters at Cincinnati, Ohio, met at Indianapolis, Ind., November 13. The objects of the meeting were primarily to get all employees in closer personal touch with each other, and second to inspect the by-product coke plant of the Citizens' Gas Company and the new Semet-Solvay installation of the Indianapolis Gas Company.

In the evening a banquet was served at the Severin Hotel, after which there was a general discussion as to plans for closer co-operation between the different offices and salesmen. Those present were: John Sergeant, president of the company; Charles H. Domhoff, Charles Sergeant, J. D. Morten, C. Hayward, A. C. Cole, P. M. McClannahan, C. H. Jenkins, W. M. Maguire, A. H. Vollmer, R. D. Jenkins, W. H. Underwood, S. T. Story, Andrew Hawthorne, W. T. Morris, F. E. Dickerson and J. C. Gore.

Every one of the company's branch offices was represented by its manager and assistants, and it was decided to hold these general gatherings more frequently.

The Lackawanna Bridge Company and the Worden-Allen Company, engineers, general contractors and steel fabricators, whose shops are at Buffalo and Milwaukee, announce that J. W. Cowper, vice-president, in charge of the general contracting department, has removed his headquarters from New York City to 612 Fidelity Building, Buffalo. The branch offices at 2 Rector street, New York City, J. P. Nicholas, vice-president; Commercial National Bank Building, Chicago, Cecil Martin, resident manager; Houghton, Mich., H. C. Felver, resident manager, and the offices at the shops will be maintained as heretofore. These companies will continue to make a feature of designing and constructing complete fireproof buildings and other structures, especially manufacturing plants, together with their regular steel fabricating and stock business.

Corrigan, McKinney & Co., Cleveland, Ohio, have placed an order with the Brown Hoisting Machinery Company, of the same city, for an ore bridge for their Cleveland blast furnace plant that is a duplicate of the one now in use. It will have a 285-ft. span, with a 90-ft. cantilever at one end and a 60-ft. cantilever at the other. It will be equipped with a 10-ton ore bucket. The Brown Hoisting Machinery Company has also just received an order from the Algoma Steel Company for an ore bridge.

The Erie Nut & Bolt Company, Erie, Pa., which has been organized to manufacture a complete line of nuts and bolts, expects shortly to begin the erection of its plant. Negotiations were under way for acquiring the plant formerly occupied by the Morse Iron Works, but it is stated that this deal has fallen through. At the head of the company is Lincoln Davis, who was formerly connected with the Eastern Bolt & Nut Company, Providence, R. I. Several Erie business men will be in the new company.

The Old Dominion Iron & Nail Works Company, Richmond, Va., is distributing a neatly printed pamphlet reproducing a number of articles on wrought iron which have recently appeared in *The Iron Age*. The company is a stalwart believer in the virtues of wrought iron, being confident that its place in the trade is assured, notwithstanding the great increase in the output of soft steel.

The plant of the American Brake Shoe & Foundry Company at Burnside (Ninety-fifth street, Chicago), which has been idle for several weeks, has resumed operations. Although the volume of business available is not much improved as compared with orders at the time of shutting down, the plant is now being operated on a more favorable basis as an open shop.

The statement in *The Iron Age* of November 13, page 1138, that the William Cramp & Sons Ship & Engine Building Company, Philadelphia, launched the torpedo boat destroyer Downes, November 8, is incorrect. This vessel is being built by the New York Shipbuilding Company, Camden, N. J., and not by the Cramp Company.

Pittsburgh and Valleys Business Notes

The National Fire Proofing Company, Pittsburgh, has received a contract for fireproofing for the new Equitable Building, New York City, and also for the fire proofing for the new building of the Ford Motor Company at Columbus, Ohio.

The H. C. Frick Coke Company, Pittsburgh, has purchased from the Pittsburgh-Buffalo Company 395 acres of coal land located in Greene County, Pa., at the reported price of $274,000. The coal underlies 12 tracts fronting on the Monongahela River.

The Metal Mfg. & Supply Company, Pittsburgh, has changed its name to the Pittsburgh Knife & Forge Company.

The Crucible Steel Company of America, Pittsburgh, is taking estimates on the installation of automatic stokers for the operation of four 300-hp. Babcock & Wilcox boilers in the power house of its plant at Jersey City, N. J.

The Gage Coal & Coke Company, Park Building, Pittsburgh, is erecting 35 additional bee-hive coke ovens at its mines in Barbour County, W. Va.

O. Yampolsky, dealer in iron and steel scrap, Pittsburgh, announces that he has become a citizen of the United States, and, for the sake of convenience, his name being difficult to pronounce and spell, he has changed it to J. L. Paul. He will continue his business under his new name.

A new system of paying the employees in the Homestead works of the Carnegie Steel Company will be put into effect at the beginning of the coming year. It has often happened that the men were compelled to wait until the end of the month for what was known as the three weeks' pay. Under the new plan the men will be paid on the 12th and 13th and 26th and 27th of each month, making two pays each month and doing away with the old system.

James Bonar & Co., Park Building, Pittsburgh, manufacturers of the Bonar oil filtering system, have taken a contract for two installations of 5000 gal. capacity each, including complete oiling systems and separators, for the Brier Hill Steel Company, Youngstown, Ohio.

The West Penn Traction Company has placed an order with F. B. Allen, Pittsburgh representative of the C. H. Wheeler Mfg. Company, for the installation of a Thyssen centrifugal air pump to be used in connection with a condensing outfit for additional generating units being installed at its Connellsville power plant. The pump is said to be one of the largest air pumps of the centrifugal type thus far installed in the Pittsburgh district.

The Mesta Machine Company, Pittsburgh, has received an order for a 40-in. condenser from the Northern Iron Company, Standish, N. Y., and has also received orders from the Girard Iron Company, Girard, Ohio, and the Wisconsin Steel Company, Chicago, for equipping their blowing engines with air heads containing the new Mesta plate valves. The last shipment of three 1000-hp. gas engines built for the Canadian Car & Foundry Company was made last week.

The Gibson Motor Car Company, Oliver Building, Pittsburgh, has bought the buildings of the Pittsburgh Tube & Steel Company, Monaca, Pa., and is having the plant remodeled for the manufacture of automobiles. The main building is 150 x 200 ft. Machine tools and equipment are being purchased with the expectation of putting the plant in operation at an early date. The company is capitalized at $1,000,000, with Dr. E. C. Gibson, Rochester, Pa.; H. C. Fry, Jr., Pittsburgh, and James Mahoney, Rochester, as incorporators.

The new mill of the Wheeling Sheet & Tin Plate Company at Yorkville, Ohio, is so nearly completed that it is expected to be put in partial operation within two or three weeks. It has 10 hot mills and is regarded as one of the most complete plants in the country in point of equipment and in methods to be used for making tin plate. The capacity will be at least 800,000 base boxes of coke plates per year, but the pickling and tinning capacity is ample to take care of a larger output. The hot mills are of particularly heavy design and were furnished by the Wheeling Mold & Foundry Company, Wheeling, W. Va. Selling agencies for the product have been appointed as follows: Wilmer Wickersham, Peoples Gas Building, Chicago; W. A. Taylor, Rialto Building, San Francisco; Geo. K. Tinker, John Hancock Building, Boston; Hoyle Jones, 605 R. A. Long Building, Kansas City, Mo.; C. E. Hutchison, New Bank of Commerce Building, St. Louis.

Clearfield Rolling Mill Again Active

The Newhall Engineering Company, 1421 Chestnut street, Philadelphia, has started its rolling mill at Hyde Station, Clearfield County, Pa., and is now rolling light steel rails of sections from 16 to 45 lb. per yd. Prompt deliveries can be made. The mill was built by the Clearfield Steel & Iron Company, a few years ago. It was designed by Julian Kennedy and the equipment was furnished by the United Engineering & Foundry Company, Pittsburgh, so that it is first class in every respect. The finishing end of the mill and the hot-beds are practically the same as those of a standard section rail mill. The heating furnaces are continuous and served with hydraulic pusher. Much of the auxiliary equipment is electrically operated from current generated at the mill.

The Newhall Engineering Company will also store and ship relaying rails from its yards at the mill, in addition to shipping relaying rails from its storage yards at Williamsport, Pa.

Next Year's Foundrymen's Meetings

The following announcement signed by the American Foundrymen's Association, the American Institute of Metals, the Associated Foundry Foremen and the Foundry & Machine Exhibition Company has been received from R. A. Bull, Commonwealth Steel Company, Granite City, Ill., as secretary of the joint convention committee:

"We are pleased to announce that the conventions of the American Foundrymen's Association, the American Institute of Metals and the Associated Foundry Foremen will be held simultaneously with the exhibit of the Foundry & Machine Exhibition Company in Chicago, September 7 to 12, inclusive, 1914."

The Easton Car & Construction Company, Easton, Pa., a new organization, of which W. E. Farrell is the leading spirit, has bought all stock, rights, plant, office records, equipment and good will of the Ernst-Wiener Company. While the change in ownership is complete, the old line of business will be conducted in industrial railway equipment—cars, track and other appurtenances. As a first example of a new progressive spirit, the fabrication of plate, tank and structural steel up to ½ in. in thickness has been added. The company has a newly erected plant at Easton completely equipped with new machinery, specifically adapted to the fabrication of the well-known Ernst-Wiener line. Everything will be sold hereafter under the trade name of the Easton Car & Construction Company. With a large stock of its products on hand, the new organization is in a position to effect immediate deliveries.

Theodore Vilter, president Vilter Mfg. Company and head of the Milwaukee Metal Trades and Founders' Association, makes an announcement which is in direct conflict with reports of a shortage of work in the iron and steel trades. He says: "We are operating the Vilter shops night and day and are getting enough new contracts to insure a continuance of this condition. We are hiring more men instead of laying them off, as reported in some lines. In October we closed contracts amounting to $150,000. We are shipping this month 20 carloads of finished products to Japan; three to New Zealand and nine to Panama. Besides this, we naturally do some business in our own country." The company specializes in Corliss engines and refrigerating plants and is a large founder.

The Iron & Steel Products Company, Tulsa, Okla., has been incorporated with a capital stock of $100,000 for the purpose of completing the plant of the Sand Springs rolling mill, now about two-thirds finished. It will also build a steel foundry and a gray iron foundry. The buildings for this plant are all erected, and the equipment so far includes the rolling mill engine, trains of rolls, steel converter and cupolas. The company is still in the market for considerable machinery. Max Weigel, master mechanic of the Oklahoma Iron Works, is in charge of the company's affairs.

Personal

E. W. Edwards, president Edwards Mfg. Company, Cincinnati, Ohio, has been unanimously elected president of the Cincinnati Business Men's Club. His company, which was organized in 1901, does an extensive home and foreign business in metal ceilings, roofings, portable garages, etc. Mr. Edwards has been a member of the club practically since its foundation. Proposed for the presidency several times, he has heretofore declined to accept the proffered honor for business reasons.

Philip O. Geier, treasurer Cincinnati Milling Machine Company, Oakley-Cincinnati, Ohio, recently married, will sail from New York November 20 for a five months' European wedding tour.

Edwin McFarland, vice-president Matthew Addy & Co., Cincinnati, Ohio, was unanimously elected a life member of the Hyde Park Country Club, at a recent meeting of the directors of that organization.

John W. Longwell, connected with the sales department of the Jones & Laughlin Steel Company, at Atlanta, Ga., has been transferred to the Cincinnati office.

George Nash, formerly general superintendent of the Glassport and Monessen plants of the Pittsburgh Steel Company, has been made general manager of works, embracing the plants at Monessen and Glassport, Pa., and Hamilton, Ont. C. J. Mogan, formerly assistant to Mr. Nash, has been made general superintendent of works.

Dr. Richard Moldenke, Watchung, N. J., and Walter Wood, R. D. Wood & Co., Philadelphia, sailed on the Olympic for London on November 15 to be away about a month in connection with the Committee on Specifications for Pig Iron and Castings of the International Association for Testing Materials.

Henry A. Waterman, for several years general superintendent of the Milwaukee works of the International Harvester Company, has resigned to accept the position of manager of design and manufacture in charge of all plants of the M. Rumely Company, LaPorte, Ind. He is a graduate of the Massachusetts Institute of Technology, Boston, '96. He reorganized and practically rebuilt the Milwaukee works, equipped it with the most modern type of automatic machinery and developed it into what is considered the largest gas engine and tractor plant in the United States, employing more than 5000 men. The past summer Mr. Waterman spent several months abroad studying conditions in the British Isles and on the Continent.

Kenichi Nakamura, representative of the Japanese Government Board of Railroads, who has been delegated to conduct a series of railroad investigations, has arrived in this country.

A recent addition to the staff of the centrifugal pump department of the A. S. Cameron Steam Pump Works, New York, is C. V. Kerr, the organizer of the Kerr Turbine Company, and later with McEwen Bros., Wellsville, N. Y. Mr. Kerr delivered an interesting address, with stereopticon views, on "A New Centrifugal Pump with Helical Impeller," at the monthly meeting, November 11, of the American Society of Mechanical Engineers, New York City.

Harold D. Tompkins, a graduate of Cornell University and formerly associated with the Niles-Bement-Pond Company, Philadelphia, has accepted the position of mechanical engineer with the Smooth-On Mfg. Company, Jersey City, N. J. He has charge of the concrete waterproofing department.

G. Fred Collins has been appointed Pittsburgh sales manager of the Protectus Paint Company, Philadelphia, Pa., with an office in the Park Building, Pittsburgh. The company is the railroad selling agent for the Barber Asphalt Paving Company's products.

Abram Wilbur Mace, manager of Factory Products, Ltd., Toronto, is the subject of a laudatory sketch, with portrait, in the issue of Canadian Machinery for October 30. The company distributes the products of the United States Steel Corporation in Ontario. Mr. Mace gained his experience in the steel trade with the Carnegie Steel Company at Homestead and Clairton, Pa. Being transferred thence to the company's warehouse at Waverly, N. J., he assisted in developing the steel warehouse business at both Waverly and Boston.

M. A. Smetts, formerly with Power Boating, succeeds Loyd W. Young as advertising manager of the Billings-Chapin Company, Cleveland, Ohio, manufacturer of paints and varnishes.

L. C. Dilks, contracting manager of the New York office, 60 Broadway, of the Eastern Steel Company, Pottsville, Pa., has been made general manager of sales, retaining headquarters, however, in New York City. R. W. Tull, assistant contracting manager of the New York office, succeeds Mr. Dilks as contracting manager and becomes solely responsible for the fabricating business of the company. C. F. Fay has been made sales agent in charge of plain material sales in the New York territory.

C. Willis Adams, former superintendent of the Link-Belt Company's Philadelphia works, has been transferred to its Chicago works, to take up his duties as assistant to the president. Frank Oakes, former general shop foreman of the Chicago works, has been made superintendent of the works at Philadelphia.

The Sullivan Machinery Company, People's Gas Building, Chicago, announces that John Oliphant, for many years president of the Harris Air Pump Company, Indianapolis, Ind., has joined its engineering staff and will have charge of the pneumatic pumping department. His thorough knowledge of and familiarity with problems of pneumatic pumping and transfer of liquids and other materials have been acquired in a practice of 20 years in all parts of this country.

Theodore Trecker, secretary and treasurer of the Kearney & Trecker Company, milling machinery builder, West Allis, Wis., has been elected president of the local board of fire and police commissioners. He served as president of the village for several years before West Allis became a full-fledged city.

Palmer Rugee, Milwaukee, left November 15 for London, England, to begin his duties as foreign representative of the Allis-Chalmers Mfg. Company.

M. G. Doll has been appointed general sales manager of the Bury Compressor Company, Erie, Pa.

Philip P. Bourne has been appointed chief engineer of the Epping-Carpenter Pump Company, with shops at Pittsburgh, Pa. He was for eight years chief of the engineering staff at the Blake-Knowles Steam Pump Works, East Cambridge, Mass. This appointment is in line with other recent activities of the Epping-Carpenter Pump Company, in strengthening its organization and enlarging its facilities to handle increasing business, especially in high duty and centrifugal pumping machinery.

Alvan T. Simonds is the new president of the Simonds Mfg. Company, Fitchburg, Mass. Other officers elected at a meeting of the board of directors of the company, held at the executive offices at Fitchburg, are as follows: C. F. Braffett, H. A. Sargent and T. F. Howarth, vice-presidents; G. K. Simonds, treasurer; H. K. Simonds, assistant treasurer; J. E. Kelley, secretary.

N. C. Walpole, Southern representative of the Niles-Bement-Pond Company and Pratt & Whitney Company, has opened a sales office and a machinery display room at 2015 First avenue, Birmingham, Ala.

C. L. Newcomb, Jr., has been appointed to succeed G. B. Turner as Western representative of the Goulds Mfg. Company, Seneca Falls, N. Y. His headquarters will be at 12 Chamber of Commerce, Denver, Col.

William E. McHenry, who during the last 15 years, as auditor of the Cambria Steel Company, installed and perfected its accounting and cost system, has severed his connection with that company and announces that he has opened an office at 1420 Chestnut street, Philadelphia, Pa., for consulting practice in all matters pertaining to manufacturing accounts and costs.

A new line of trimming presses will be brought out shortly by the Erie Foundry Company, Erie, Pa., for use in connection with steam drop hammers.

The Burger Iron Company, Akron, Ohio, has increased its capital stock from $100,000 to $120,000.

Obituary

EVERETT FLEET MORSE, Ithaca, N. Y., died November 11, aged 56 years. He was born at Ithaca, and when only 16 years old he patented an improvement on the horse drawn lag rake. He made good use of the earnings from this invention to supplement other efforts to secure an education. He attended Cornell University in 1875 and, after being out for several years, graduated with the class of 1884 as a mechanical engineer. After spending some time at Algona, Iowa, as manager of a flax mill, he located at Trumansburg, N. Y. There in 1893 he patented the Morse rocker-joint chain for bicycles and in conjunction with his brother, Frank L. Morse, founded the Morse Chain Company and began the manufacture of bicycle chains. The correct mechanical principle embodied in this chain, as well as its novelty, attracted immediate attention and secured for the company a profitable business which lasted until the slump in the bicycle trade, about 1897. In the meantime, his brother, who has been the active manager of the chain company for the past 13 years, developed the present type of silent chain for power purposes and in 1906 built the new plant at Ithaca where the business has grown from small beginnings to its present proportions. At the time of his death, E. F. Morse was a director and also secretary of the chain company, but for some years past devoted himself largely to his own interests. The Morse thermo gauge, which he invented, was patented about 1900 and is an ingenious device for the measurement of the temperature of steel. It won him much distinction at home and abroad, having been adopted both by the United States and German bureaus of standardization. In recognition of the high mechanical merit of the rocker joint chain and thermo gauge, Mr. Morse was awarded medals by the Franklin Institute.

STEPHEN BULL, Racine, Wis., one of the founders of the J. I. Case Threshing Machine Company, and interested in other large industrial plants at Racine and Milwaukee, died November 15 after a long illness, aged 91 years. He had been blind for a number of years. He was born in New York State, and at 11 became a wage earner. In 1845, when 23, he located in Racine and for 10 years was engaged in the mercantile business, retiring to become associated with Jerome I. Case, his brother-in-law, in the manufacture of agricultural implements. With Mr. Bull, Robert H. Baker and M. E. Erskine, Mr. Case developed the threshing machine company, now the largest of its kind in the world. Mr. Bull was the last survivor of the four. For 20 years he was president of the Milwaukee Harvester Company, now the Milwaukee works of the International Harvester Company. He organized several banks in Racine and neighboring cities. About 10 years ago he retired from all active affairs and was succeeded by his son, Frank K. Bull, now president of the Case Company. He was a devoted agriculturist, operating several large farms. His benefactions, while large, were unostentatiously made. He supported more than 100 poor families in Racine without permiting the fact to become known even to the beneficiaries.

JAY MORSE PICKANDS, member of the firm of Pickands, Mather & Co., Cleveland, Ohio, died suddenly at Lakeside Hospital in that city November 18 from complications following an operation for appendicitis. He was stricken at Ludington, Mich., November 10, while on a business trip and was hurried back to Cleveland, where he was operated on two days later. He was the youngest son of the late Col. James Pickands, one of the founders of the firm and was born in Marquette, Mich., February 21, 1880. He was graduated from Yale in 1902 and in 1903 became associated with Pickands, Mather & Co., in the pig-iron department. In April, 1911, he was admitted to the firm. He was a member of the American Iron and Steel Institute and the Union, Country, Athletic, Tavern and Mayfield clubs in Cleveland. He leaves a widow and a daughter.

WILLIAM CORRY, who was for a long time connected with the manufacturing end of the stove trade in New York City, died November 13 at his home at Douglaston, Long Island, aged 77 years. During the civil war he was quartermaster of one of the regiments in Sherman's army and participated in the famous march to the sea. He was a facile and entertaining writer, and for years contributed quite regularly to the columns of the Metal Worker. He leaves four sons.

GUY A. DU BOIS, president and general manager of the Byron Jackson Iron Works, San Francisco, and inventor of the gold dredger which bears his name, died November 12 at his home in Berkeley, Cal., aged 45 years. He was a native of New York. He leaves a widow, two sons and two daughters.

FRED F. FISCHER died at his home in Beechview, Pittsburgh, November 10, aged 50 years. He was a mechanical engineer and one of the owners of the Fischer & McKallip Foundry & Machine Company, Pittsburgh.

National Founders Meeting

A record was broken by the meeting opened on Wednesday morning at the Hotel Astor, New York City, of the National Founders' Association. A greater number of employees are represented by the members of the association, which is holding its seventeenth annual meeting, than ever before, although there were more employers in the association at the time of the 1903 meeting. Prior to the opening of the Wednesday morning session, it was learned that O. P. Briggs, H. E. Wilcox Motor Car Company, Minneapolis, Minn., is to retire from the presidency of the association after an official connection of 10 years, two as commissioner, one as vice-president, and seven as president. It is thought he will be succeeded by William H. Barr, Lumen Bearing Company, Buffalo, N. Y. Otto Falk, Milwaukee, will be elected vice-president.

Among the subjects for discussion on Thursday morning are safety and sanitation by M. W. Alexander, General Electric Company, Lynn, Mass., and workmen's compensation by Staunton B. Peck, Link Belt Company, Chicago; C. H. Gifford, American Blower Company, Detroit; H. P. Macdonald, Snead & Co. Iron Works, Jersey City. At this writing the reports of the officers are being presented. On Tuesday night was held the usual dinner of the so-called alumni, former officers and members of the administrative council. The attendance was large, some 40 in all being present.

Dominion Steel Corporation Financing.—Montreal advices report that a London cable states that J. H. Plummer, president Dominion Steel Corporation, has closed negotiations with respect to the present financial plans of the company and that $3,750,000 has been secured on five-year notes at 6 per cent. It is stated that the notes are secured upon the bonds of subsidiary companies for whose benefit the notes are issued. The proceeds will pay off all moneys expended on construction, which, so far as the steel works are concerned, was completed last summer.

The Bucyrus Company, South Milwaukee, Wis., is executing a contract for the Isthmian Canal Commission for the construction of two of the largest dipper dredges ever built. The dredges are to be delivered at New York December 15 and towed to Panama. The company has thus far furnished 30 steam shovels and several powerful wrecking machines and railroad piledrivers for the Panama Canal, being perhaps the largest single contractor for such equipment.

The general contract for what is said to be the highest reinforced concrete building erected in America up to the present time has been awarded to the Turner Construction Company, 11 Broadway, New York City. It covers the construction of a 16-story loft and factory building, 105 x 201 ft., which is the most recent addition to the plant of the Robert Gair Company, paper box manufacturer, Brooklyn, N. Y.

Fairbanks, Morse & Co. are completing work on the large addition to the gas engine assembling and finishing shop at Beloit, Wis., commenced several months ago. The building is planned to connect the principal buildings comprising the works and will place about six acres of floor space under one roof. It is expected that the new structure will be available before January 1.

Vancouver, British Columbia, will have a furnace for the manufacture of pig iron, if a project now under consideration develops into realization. The men behind the deal are Henry Hewitt, of Tacoma, and T. C. MacDonald, of Vancouver. A company is to be formed with a capital stock of $15,000,000.

Correspondence

Steel, Wrought Iron and Corrosion —A Review

To the Editor: Herewith are submitted the fundamental facts about wrought iron and steel and their relation to corrosion:

Steel is made at a high temperature, causing the metal to be very fluid, and during the cooling of this molten mass in the newly born ingot the impurities still left in the metal, such as carbon, manganese, sulphur, etc., flock together in irregularly distributed groups. This is technically known as "segregation." I quote from an article by William R. Fleming in *The Iron Age* of March 14, 1912:

Influences beyond the power of man to alter are at work during the cooling of the liquid steel, and the segregation of impurities leaves the solid steel irregular chemically. . . . The most serious drawback of steel is its lack of uniformity in resisting corrosion.

In the Engineering Magazine of July, 1911, Bradley Stoughton says in an article on "Corrosion of Iron and Steel":

The segregated portions of steel will rust much faster than the same metal in which the impurities are evenly distributed.

Wrought Iron in the Making

Wrought iron is made at a much lower temperature than steel, which causes the small particles or granules of iron, as they become purified in the puddling furnace, partly to congeal in a bath of liquid cinder, the melting point of which is much lower than that of the pure iron. This results in the granules becoming coated with envelopes of cinder, as peas in a soup are coated with soup.

When this newly born lump of wrought iron is removed from the puddling furnace, it resembles a huge sponge consisting of granules of pure iron from which the surplus cinder is dripping. The squeezing and subsequent rolling out of this sponge cause a large portion of the cinder to be forced out, but thin films of the cinder are left behind and are elongated with the granules during the process of rolling, giving wrought iron a fibrous structure. This inclosed cinder consists principally of silicate of iron, similar to the outer skin of iron castings. Silicate of iron resists ordinary corrosion better than pure iron, as is proved by the greater rust-resisting power of cast iron. The presence of these fibers of silicate of iron (cinder) in wrought iron is responsible for its having greater resistance to corrosion than steel.

Just as paint is a protection against corrosion on the outside of the metal, so the cinder fibers permeating wrought iron are a protection in the interior of the metal. A wrought-iron bar is like a wire rope in which each individual wire has been painted before the rope was put together.

Segregation in wrought iron is impossible, as, on account of the plastic state of the mass, any impurities that may be present are held captive wherever they are, without any chance to flock together, similar to the way in which other ingredients are held captive in dough or putty, while in a liquid they are at liberty to flock together.

After the original sponge has been rolled out into bars (muck bars), these are cut up, piled one upon another, reheated, and then welded together and rolled out again. This not only mixes the bars of the same heat, but bars of other heats are mixed in with them, so that the finished iron will be more of an average quality and more nearly uniform than steel.

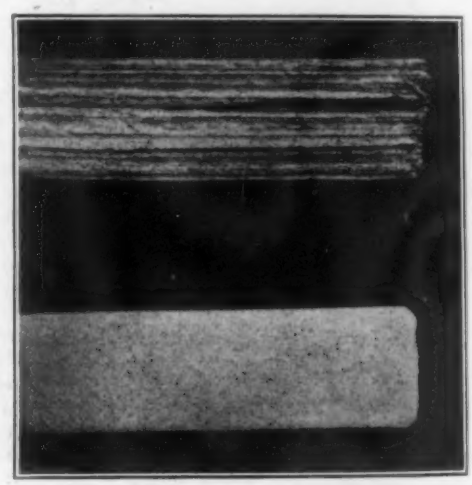
Steel is rolled out of the original ingot to the finished product without any overlapping or the mixing in of steel of other heats; therefore, whatever chemical irregularities exist in the original ingot, the same irregularities will still exist in the finished strip, no matter how long it may be. This accounts for what Mr. Fleming calls the "notorious irregularity of steel" in "the same batch of stuff," meaning that made from the same ingot.

Corrosion Tests

Experts differ as to the exact cause of corrosion. Some attribute it to electrolytic action, while others claim it is simply a dissolving of the metal by oxidation. What makes the problem still more difficult to solve is the fact that corrosion frequently acts very capriciously, sometimes concentrating itself on certain spots (pitting), while at other places and under apparently the same conditions it will diffuse itself over larger areas.

After experience in actual practice had demonstrated the fact that steel rusted out much faster than the old-fashioned puddled wrought iron, the steel manufacturers naturally tried to find the cause, with a view to increasing the durability of steel, if possible. As stated farther on, they experimented by varying the different ingredients, but the problem is to find a quick and at the same time a reliable method of testing durability under ordinary conditions.

Paradoxical as it may seem, it has nevertheless been conclusively demonstrated that while silicate of iron will resist corrosion due to ordinary exposure much better than pure iron, it will readily dissolve in a strong acid; therefore, if we put a piece of wrought iron in acid, the dissolving of the silicate of iron (which is distributed between the iron fibers) will open up new surfaces for the acid to attack the iron. This explains why steel, which is practically free from silicate of iron, will in most cases resist strong acid better than wrought iron; in other words, the silicate of iron acts as a rust protector the same way as a thin coat of paint, for, if we pour a strong acid on paint we also destroy its usefulness.



Appearance of wrought iron and steel after immersion 15 or 20 minutes in a solution 9 parts water, 3 parts sulphuric acid and 1 part muriatic acid.

Here we have the most important feature of this whole controversy. The claims made by the manufacturers of the different brands of soft steel sold under various mystifying names are based almost entirely on accelerated corrosion tests made on either small samples in a laboratory or in extraordinary service where the acid nature of the surrounding conditions will cause a quick dissolution of the silicate of iron.

Testimony from Investigators

It is of the utmost importance to bear these facts well in mind in order to discriminate justly between the claims of superiority of a new metal based on accelerated corrosion tests and the proof of actual service of many years' duration. Our contention will be made more clear by some extracts from the conclusions arrived at by a few of the investigators of this subject. R. C. McBride reports as follows on the results of tests he made:

The first example examined was a piece of sheet-iron roofing which was known to have been in service for more than 40 years, and in that time to have received but two coats of paint. Here was a chance to make an "accelerated" test on a sample which had already demonstrated its ability to resist the conditions of actual service. A carefully cleaned piece was submitted to the action of 2½ per cent. sulphuric acid at room temperature for 24 hours. To our surprise the sample showed a loss of 71 per cent. in weight. . . . The analysis shows it to have been the real old puddled iron.

At the end of the "accelerated" test, the iron presented a very marked foliated structure, which viewed edgewise resembled a stone wall from which all the cement has been removed. This peculiar appearance at once suggested that the slag had been attacked and dissolved out more readily than the iron. . . . This seems to support the old theory that the weather-resisting power of puddled iron was largely due to the protective action of inclosing layers of slag . . . while the greater susceptibility of this iron to "accelerated" corrosion is due to the fact that the diluted acid employed readily attacks this protective coating and, by opening up the foliated structure in this way, multiplies the surface exposed to corrosive action. It is well known that slag resists, almost to the point of immunity, the corrosive agents of actual service.

Dr. William H. Walker, after making a comparative accelerated corrosion test of iron and steel, concludes:

The results show that no reliance can be placed in the accelerated acid test, but that it may be entirely erroneous and very misleading. Not only did the acid test not agree with the service test when steel was compared with iron, but the steels failed to agree among themselves, and the irons showed no agreement when considered by themselves.

According to Dr. Allerton S. Cushman:

Purchasers should not allow themselves to be influenced by the showing made by a series of laboratory acceleration tests. . . . The general experience in service lasting over considerable periods of time and the accumulated tests made by a number of different investigators do not justify any such conclusion [as has been drawn from such tests].

L. J. Campbell, Youngstown, Ohio, says:

These accelerated tests have been so generally discredited and so strongly denounced that it would seem a waste of time to dwell upon them were it not for the fact that they form the sole argument upon which merit claims are made by the manufacturers of these so-called open-hearth "irons" and non-corrosive metals.

Results of Actual Service

With the accelerated corrosion tests proven unreliable and misleading, the only safe guide left is the one of actual use under ordinary service conditions. We therefore quote a few examples from practical experience.

R. H. Gaines stated in the Engineering News of May 28, 1908, that a large water conduit made of wrought-iron sheets 3/16 to ¼ in. thick, many miles in length, laid near the city of Rochester, N. Y., in 1874, required not a cent for repairs for the first 19 years; that between 1894 and 1904 a few leaks due to corrosion appeared (less than ten), and none have been reported since. In 1890 another conduit was laid near the old one. This was made of steel sheets ¼ to ⅜ in. thick. This steel conduit began to leak in 1900 and has been developing new holes ever since, so that 164 holes had been repaired by 1907, notwithstanding the frequent digging up of the conduit for renewal of painting, japanning, tar coating, etc., and also notwithstanding the fact that some of the steel sheets were twice as thick as the wrought iron. We have since been advised that up to 1909 only three sheets of wrought iron in all had been pitted, while the steel conduit was pitted in 350 places. Mr. Gaines quotes similar experiences of corrosion of steel in connection with the municipal water supplies of Portland, Ore., Cambridge, Mass., New Bedford, Mass., Pittsburgh and Allegheny, Pa., the East Jersey Water Company, and Atlantic City, N. J.

James P. Roe, Pottstown, Pa., writing on June 7, 1912, says:

A wrought-iron stand pipe erected in 1896 at Sea Isle City, N. J., 10 ft. in diameter by 100 ft. high, was in such good condition in 1911 that 25 ft. was added to top, by which pressure and service were increased. A steel stand pipe erected in 1897 at Avalon, N. J., four to five miles away from above, corroded through and out of service in 1911. Now being replaced with wrought iron.

In the Indiana gas belt two parallel pipe lines were taken up on account of the gas giving out. Each line was 25 miles long, and the two lines had been laid side by side in practically the same soil and had transported the same kind of gas. The wrought-iron pipe was 8 in. in diameter and had been in service 18 years, while the steel pipe was 6 in. in diameter and had been in service only 11 years. While 24¾ miles (over 99 per cent.) of the wrought-iron pipe was still in good condition after being taken up, 1200 ft. (nearly 1 per cent.) was corroded so as to make it unfit for further use. On the other hand, 14 miles (56 per cent.) of the steel pipe was thrown aside for the above reason, 11 miles, or 44 per cent., being still in good condition.

Quoting again from Mr. Fleming's article in *The Iron Age* of March 14, 1912:

A steel roof often begins to leak in a comparatively short time. Examination reveals the fact that only a few of the sheets are corroded, and these only in small patches. . . . A few bad sheets condemn the whole roof. There is a conspicuous lack of uniformity in all steel roofs, especially large ones on which many sheets are used. . . . A wrought-iron roof lasts almost a lifetime. It is not the case that a small number of sheets become defective and condemn the whole roof. Every sheet is uniformly good, and when the roof is torn away, after decades of service, the sheets are found to be uniformly bad. Corrosion has done about the same damage to every one. The same facts apply to wrought-iron pipe lines.

Other Advantages of Wrought Iron

In addition to its greater resistance against corrosion, wrought iron has many other advantages over steel:

a. Wrought iron welds more easily and more uniformly than steel, and the danger of imperfect welds in wrought-iron pipe is reduced to the minimum.

b. Threads can be cut better and more easily on wrought-iron pipe than on steel pipe, which can easily be verified by consulting any pipe fitter.

c. Owing to its fibrous structure, wrought iron will resist vibrations and shock better than steel, making the former preferable for oil well tubing, drive pipe, etc.

d. Wrought iron has a rougher surface than steel. This will cause paint, tar or galvanizing to stick better and in thicker layers, so that when using galvanized wrought-iron pipe we not only have a better metal as a base, but a thicker coating of zinc in addition.

Imitation Wrought Iron

The remarks about wrought iron made in the preceding paragraphs have reference to genuine wrought iron made from puddled pig iron only. Unfortunately, there have been some irons put on the market that are made by using old junk-yard scrap, heated in a furnace to a welding heat (busheling or fagoting), and then rolled out into bars, sheets, etc. When the old scrap consisted of nothing but wrought iron, it was not so bad, because wrought iron is permeated with the cinder fibers which were produced in the puddling operation. But junk-yard scrap nowadays is mixed with more or less steel—some of it, maybe, high carbon or other alloy steel of various grades—and since steel is not permeated with cinder fibers, when these pieces get rolled into the iron, you have a starting point for corrosion or pitting. We fear that some of this kind of iron has been paraded as genuine wrought iron and in some cases picked out when making comparisons with modern steel.

Efforts to Improve Steel

Ignoring the fact that the physical structure of wrought iron with its inclosed cinder fibers is the cause of wrought iron's greater resistance against corrosion, many metallurgists have been experimenting with steel by varying the proportion of the ingredients. Some claimed that manganese was the sole cause of the trouble, and therefore they tried to keep it as low as possible. Others claimed that manganese will kill the alleged microbe of the rust disease (occluded oxygen), and therefore they increased its percentage. Again others claim that copper will help to resist corrosion and point to accelerated corrosion tests as proof; while yet other experts consider that copper only serves to retard the acid test and confuse the unsophisticated.

A specially named steel was put on the market a few years ago, and a better resistance to corrosion than ordinary steel possesses was claimed for it. At first the process was kept a secret, but repeated challenges finally brought forth the statement that the treatment is mechanical only—that it consists simply of rolling ridges and depressions into the skelp (sheets from which pipe is made) on its second or third last pass through the rolls (similar to the rough surface one sees on steel sheets when used for cellar doors, etc., on sidewalks), and then rolling them out again by passing it through smooth finishing rolls. It

is claimed that this process kneads the surface and makes it denser. While we believe that this roughening and smoothing out again have absolutely no effect on the finished skelp, we do know that, even if it did make the surface denser, the skelp must subsequently be reheated to a welding heat in the tube welding furnace, and that this heat treatment will restore the texture of the steel to its original condition. Furthermore, as stated in an earlier paragraph, the irregularity of steel in its resistance to corrosion is due to its irregular chemical composition, and the irregularity in the chemical composition of the original steel ingot still exists in the finished pipe. No amount of mechanical treatment can change this chemical irregularity. It can, therefore, be plainly seen that the claim that this process will increase the rust-resisting qualities of steel is utterly fallacious.

As it is much cheaper to make steel by refining the raw material in a fluid state, either in the open-hearth furnace or the Bessemer converter, than to refine it by the old style of puddling pig iron, it is but natural for the steel maker to wish that this greater rust-resisting quality of wrought iron were due to its chemical composition rather than to its physical structure. Ignoring segregation, the former can easily be approached in the open-hearth furnace, but the latter can never be imitated by any steelmaking process that refines the metal in a fluid state. We may as well attempt to roll out molten lead and give it the texture of a woven fabric. Calling such steel by various table names will not give it the fiber. The only way these life-prolonging cinder fibers can be produced in the metal is by the puddling process.

Explanations of Steel Corrosion

When the fact of the more rapid corrosion of steel pipe and sheets in ordinary use could no longer be denied, the explanation was offered that "steel has come into wide use simultaneously with the great increase of the sulphurous acid in our city air and of strong electric currents in our city ground, which may well lead the practical man, be he hasty or cautious, into inferring that the rapid corrosion of today is particularly due to the new metal of the day, steel, whereas in fact it may be wholly due to the new conditions of the day, sulphurous acid and electrolysis.

At a meeting of the Engineers' Society of Western Pennsylvania in 1907, a statement was made similar in effect to the one quoted above, and in the discussion that followed K. F. Stahl called attention to the rapid corrosion of steel due to a change his company made some years ago, as follows:

> We extended a building and used the old sheets, which had been in use for eight or nine years, on the sides of the old building which we extended. On the ends we used new steel sheets, and I found after four or five years the steel sheets were considerably corroded, while the old iron sheets were still good.

So here we have an example of old iron sheets, which had already done service for eight or nine years, when exposed to the influences of this very self-same modern corrosive atmosphere outlasting the new steel sheets, which corroded in four or five years.

Another statement, made before a meeting of the New England Water Works Association in Boston in December, 1911, was to the effect that, due to the better treatment of municipal water supply, by filtration, etc., the water nowadays is much purer than formerly, and that the purer the water the harder it is on the pipe. Mr. Hazen, the president of the association, in referring to this claim, said:

> At the same time, we find that in many important enterprises, where people are studying the conditions very carefully, they think they had rather have wrought-iron pipe, and they are willing to pay a substantial increase in price in order to get it.

Analysis of Claims for Steel Pipe

Some years ago T. N. Thomson, Scranton, Pa., made some tests by putting a few short pieces of 2-in. wrought-iron pipe and steel pipe alternately into a hot-water service line. After one year's use he measured with a micrometer the depth of the depressions supposed to have been caused by corrosion, and then made calculations to ascertain how much longer each pipe would have lasted before perforation would take place. He concluded that steel pipe would last 54 7/10 days longer than wrought-iron pipe. The total amount of pipe tested was about 10 ft. When we consider the capriciousness of corrosion and the variations in the quality of steel, it must be admitted that such a miniature test is of no value, compared with the evidence of actual service of larger pipes, miles in length, weighing thousands of tons, and where corrosion continued until the holes penetrated the metal. Although this test has been declared valueless by other experimenters, as well as by technical journals, yet it is the table of this very experiment that is repeatedly being published in attempts to prove the superiority of steel.

Another favorite exhibit by the champions of steel is to show pictures of pipe laid in mine water; but considering that the water in some mines is very acid, and in view of what has been said above under the head of "Corrosion Tests," this also is valueless as a guide to behavior under ordinary service conditions.

The report of Prof. Ira Woolson on the condition of wrought-iron and steel pipe in some public bath houses in New York City, as published in the advertising columns of some technical journals, mentions the fact that:

> Out of 89 samples collected, fully 17 were undoubtedly wrought iron. The wrought-iron pipe was mixed indiscriminately among the steel pipe, and there was no way of telling one from the other until tested, although investigation of the specifications showed that all except two called for galvanized wrought-iron pipe. The probable explanation of the presence of steel among the wrought iron is that the pipes were accidentally mixed, either by the manufacturers or the jobbers.

Now, if this pipe was furnished by manufacturers or jobbers unscrupulous enough to mix over 80 per cent. of steel pipe into a lot of pipe sold as wrought iron, they certainly would not hesitate to furnish so-called wrought-iron pipe made of junk-yard scrap, as mentioned above, and it need therefore surprise no one that such pipe was as susceptible to the attack of corrosion as steel pipe.

Recapitulation

Having explained the great irregularity in the behavior of steel under the same conditions, due to the irregularity of the metal, and furthermore that there are so many other influences at work that cause variations in the corrosion of metal of even as uniform a quality as wrought iron, the explanation becomes very easy why some few pieces of steel pipe can be found occasionally that have resisted corrosion very well, while under apparently identical conditions wrought iron has been corroded.

Should we make a scientific examination of a sample of the corroded wrought-iron pipe in the Indiana gas belt as cited above, and also of a sample of the steel pipe of the parallel line which was still in good condition, a big essay could be written on the superiority of steel. Yet as a matter of fact the damage done by corrosion of the steel pipe in 11 years was over 55 times greater than the damage done to the wrought-iron pipe line in 18 years. We must not be misled by a few isolated failures, but take the majority of cases as a guide.

We admit that under favorable conditions some steel pipe has given good service, while other steel pipe has corroded very rapidly; but, owing to the admitted irregularity of steel in its resistance against corrosion, nobody can predict how any particular piece of steel pipe is going to behave. You may get pipe that will last, and you may not.

Mr. Fleming, in his article published in *The Iron Age* of March 14, 1912, extolling the virtues of a new soft steel which had been christened "Genuine open-hearth iron," admits that "wrought iron in service resists corrosion better than steel. This truth is demonstrated by an overwhelming mass of practical evidence." In view of the fact that all of these alleged rust-resisting steels or so-called "irons" are of comparatively recent invention, the practical evidence of long service is naturally lacking. The arguments are based on accelerated corrosion tests, which have been proved entirely misleading.

Don't let us forget that none of these steels contains the cinder fibers which give wrought iron its longer life. The claims of the manufacturers that making a few slight changes in the chemical composition of their steel will prolong its life are simply a fond hope, in which the wish is

father to the thought. The proof of behavior during many years' actual service is at this time a physical impossibility.

Let us pause for just a moment and consider that in the case cited above by Mr. Roe, the steel (which was not specially treated) lasted ten years before the first perforation occurred; that it required 20 years before the thinner wrought iron had a hole, and that the wrought-iron conduit has now been in use nearly 40 years. How can anybody prove now that his new steel or "ingot iron," or whatever it may be called, will last as long as wrought iron, or even as long as the ordinary steel, or tell what its condition will be ten years hence?

It will not cost any more to dig the trench for wrought-iron pipe than for steel pipe; the pipe fittings will cost the same; and, considering that wrought-iron pipe threads more easily than steel, it really ought to cost less to put it in place, as there are fewer splits due to imperfect welds, which require rethreading, etc. The only difference is in the cost of the pipe itself. The expense and annoyance of replacing rusted out pipes inside of walls or under floors more than offset the small difference in first cost of genuine wrought-iron pipe.

GEORGE SCHUHMANN,
General Manager Reading Iron Company.

READING, PA., October 30, 1913.

Trade Publications

Engineers' Supplies.—W. G. Hagar Iron Company, 2208 North Second street, St. Louis, Mo. Catalogue No. 6. Deals with an extensive line of supplies for machinists and engineers, mines, mills, railroads, steamfitters, boiler makers and blacksmiths. The various appliances are illustrated and tables of the different sizes in which they can be supplied are included, there being practically no text in the catalogue. A number of tables of useful information are given, together with a telegraph code and a complete index.

Track Supplies.—Spencer Otis Company, Chicago, Ill. Railway track handbook. The book is divided into three sections relating to track laying and renewals, spikes and tie plates. Illustrations of the various types of spikes and plates are given, and there are a large number of tables giving the quantities of rails, splice bars, track bolts, etc., for laying different lengths of track, as well as tables of dimensions of several kinds of spikes, both plain and screw. Considerable useful information on the cost of various metals and different classes of railroad work is included.

Electrically Driven Tools and Motor-Generator Set.—James Clark, Jr., Electric Company, Louisville, Ky. Catalogue No. 22. Describes and illustrates a large line of portable and stationary motor-driven tools, in which both the driving motor and the driven tool are combined in one machine. These include drilling machines of various types, grinding machines, a hack saw and a notching press. Mention is also made of a motor-generator set for providing current of the proper voltage to run these tools.

Electrical Apparatus.—Wagner Electric Mfg. Company, St. Louis, Mo. Booklet and miniature bulletins Nos. 101 and 102. The first, which is entitled "Pioneers," reviews the history of the most prominent of the pioneers in the field of electrical endeavor and also brings out some of the results of the pioneer work done by this company, such as the first 10,000 and 40,000 volt transformers built in this country and electrical measuring instruments of the dynamometer type. The bulletins which are miniature editions of the company's regular literature, deal with single-phase and polyphase motors. In both illustrations of the motors and their various parts are given, together with examples of their use and reproductions of test curves and connection diagrams. While the bulletins only measure 3½ x 5 in., the type in the descriptions of the motors is exceptionally clear and easily read.

Screw Machine Products.—National Acme Mfg. Company, Cleveland, Ohio. Calendar. Size, 12 x 15 in. Each of the twelve leaves, in addition to giving the calendar for one month, beginning with November, contains an illustration either of a screw machine or some of its products or accessories. Among these is the company's standard multi-spindle screw machine and a spring die, both of which were illustrated in *The Iron Age*, June 14, 1908, and November 30, 1911, respectively.

Smoke Prevention.—Rockford Smoke Preventing Company, 201 East State street, Rockford, Ill. Folder. Concerned with the Beam system of smoke prevention which was illustrated in *The Iron Age*, July 31, 1913. A discussion of the cause of smoke and its prevention is given, together with a description of how this system prevents smoke and saves fuel. Data on the economy of the system are also included.

Steel Stamps.—E. Konigslow Stamping & Tool Works, 184 Champlain street, Cleveland, Ohio. Folder. Treats of a line of steel letter, figure and name stamps which can be furnished for stamping wood, iron, steel, brass, ivory, tools and patented articles. These stamps can be furnished with letters from 1/32 to ½ in. wide, in either Gothic or Roman letters. In addition, initial stamps, fancy letters and designs, etc., can be supplied to order.

Watthour Meters.—Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa. Pamphlet No. F-4241. Deals with a line of alternating-current watthour meters, which are made in various styles for use on both single and polyphase circuits. Views of the different types of instruments are given, together with a brief description of their construction and operation.

Key Seating Machines.—Chattanooga Machinery Company, Chattanooga, Tenn. Collection of loose leaf circulars. With the exception of one circular all contain nothing but illustrations of a particular machine. The remaining one gives general description and specifications for the line which is built in eight sizes for cutting key seats from 1/16 to 5 in. wide, and from 6 to 40 in. long. In this circular a view of the cutter bar and the key seating equipment furnished are given.

Drawn Steel.—National Drawn Steel Company, East Liverpool, Ohio. Pamphlet. Gives a general idea of the various kinds of cold drawn steel made by this company which includes drill rods, flats and squares; cast steel, watch and needle wire; hexagon rods and tool steel in different shapes. Brief descriptions of the properties of the several products are given, together with a number of engravings showing special shapes that have been furnished. A list of the extras on alloy steels is included as well as a number of tables of weights.

Motor Trucks.—Garford Company, Elyria, Ohio. Pamphlet. Gives a general description of a line of motor trucks and shows a number of views of the trucks in use for various purposes.

Burners.—Tate, Jones & Co., Inc., Pittsburgh, Pa. Circular No. 143 and folder. The first refers to a liquid fuel burner for use under marine boilers, in which the oil is completely atomized without the use of steam or compressed air. A description of this burner is given, together with a diagram showing the pumping, heating and regulating system employed in connection with oil fuel for boilers. The folder gives a brief general description of the Kirkwood burner for natural gas and shows its application to a rotary cement kiln.

Hack Saw Frame.—Millers Falls Company, 28 Warren street, New York City. Circular. Describes a new type of hack saw frame with a pistol grip. The blades are strained by a thumb nut and screw stud placed below the handle, so as to give a maximum stroke, and in this way it is possible to face the blade in four directions. The frames can be extended to take blades ranging from 8 to 12 in. in length.

Mine Haulage Supplies.—Coshocton Iron Company, Monongahela, Pa. Pamphlet. Illustrates a line of mine sheaves, rollers, grips and miscellaneous equipment, tables of the various sizes which can be supplied being given. In addition to these standard products the company is prepared to supply anything that may be desired in the way of sheaves, special equipment or castings.

Automatic Dial Scale.—American Kron Scale Company, 39 Cortlandt street, New York City. Pamphlet. Concerned with an automatic dial scale, designed especially to meet the demand for an automatic, instantaneous and accurate weighing machine. In this scale, which was illustrated in *The Iron Age*, April 25, 1912, knife edges, pivots and springs in the dial mechanism have been eliminated and the movement of the pointer is automatically controlled by a compressed air device, which takes up any vibration in the dial mechanism. All of the different types of scales are illustrated and briefly described, with condensed tables of specifications, and there are a number of views of the scales in operation. These scales can be supplied in both portable and stationary platform types, with a pan and as a track scale for use in connection with overhead trolley systems. If desired, all of these scales can be furnished with a tare beam, so that only the net weight is indicated on the dial.

Rubber Products.—Boston Woven Hose & Rubber Company, P. O. Box 5077, Boston, Mass. Catalogue. Size, 5¼ x 7¾ in.; 296 pages. Consists of an assembly of separate books relating to canvas and rubber belting, insulating tape, hose and other mechanical rubber goods. The rubber belting composed of rubber and canvas is especially featured. It is claimed to be so constructed as to be uniform in thickness and width and smooth running. The rubber is said to protect the belt and greatly increase its adhesion. Mention is made of a pulley covering and conveyor belting. Much general information concerning belts and other products is included.

Stokers and Clay Products.—Laclede-Christy Clay Products Company, Manchester and Sulphur avenues, St. Louis, Mo. Booklet and folder. The former treats of a stoker with an automatic traveling, self-cleaning, endless chain. The coal is said to be spread evenly and is carried under an ignition arch where the volatile gases are consumed. The remaining coke is consumed toward the back of the grate and the ashes discharged at the rear, practically free from carbon. Among other features are take-up boxes at the sides, allowing tension changes to be made while the stoker is in operation. Among the clay products mentioned is a line of firebrick for blast furnace, boiler and other uses, salt glazed, vitrified sewer pipes, special boiler arches and jamb blocks. Tables of Government tests of bricks are given.

Steam Specialties.—National Steam Specialties Company, 12 South Clinton street, Chicago, Ill. Collection of folders. Relate to air and pressure relief valves, radiator fittings and a heat intensifier, all of which are illustrated and described. Cross-sections and methods of installation are shown.

The Machinery Markets

To the timidity of capital is ascribed most of the dullness which prevails in machinery lines in nearly every part of the country and the general belief is that no substantial betterment is likely until money is more available for trade purposes, although at the same time the desired result must be helped along by at least the partial clearing up of various contributing causes, as, for instance, the railroad rate question. The trade in New York is dull in all branches and the immediate future is not promising. In New England there has been a sharp letting up, but those who are looking into the future see some reasons for optimistic hopes. The larger industrial plants in Philadelphia are less active, the machinery trade is dull and no turn for the better is expected this year. Dullness is general in Cleveland, where the blizzard made conditions worse than they otherwise would have been. The export business is spotty in Cincinnati and demands from the railroad and automobile factories are light. Detroit shows no improvement and the business in single tools is irregular. Chicago has had a few good orders, including some for manual training school requirements, but on the whole business is light and scattered. There is promise of better buying after January 1 in Milwaukee, but present conditions are dull. The machinery field in the Central South is extremely quiet. Quietness is the feature in St. Louis also, with tight money given as the cause. In Birmingham there is a common indisposition to spend money for other than actual needs. Irrigation products and other outdoor work have caused a slight betterment in the demand for some kinds of equipment in Texas. Machinery houses find trade quiet on the Pacific coast, but the overhauling of lumber plants will result in better activity in December and January.

New York

NEW YORK, November 19, 1913.

In the New York territory there is no change in machinery trade conditions except that the dullness of recent weeks is more general. Some local sales managers who had hoped that this year's total of business would exceed that of last year by a comfortable margin are now apprehensive lest 1913 does not equal 1912. Until August they had good reason to believe that a satisfactory increase would be shown this year, but in view of the present falling off in demand they say they will consider themselves lucky if they approximate last year's figures. As was stated last week, there is a great deal of conjecture as to the causes and particularly the main cause for the slowing up of buying, but the question most heard now is "how long is it going to last?" None of the trade looks for much betterment before January 1, while not a few do not expect any real revival of buying until about the second quarter of 1914. As to the causes for the slowing up of operations, the currency question is usually given as the leading cause, while contributing also are the new tariff, the railroad situation, involving both rates and wages, the Mexican puzzle, promise of further investigations of corporations and even the income tax. The railroads continue out of the market with the exception of an occasional inquiry put out by the Pennsylvania Railroad, but these are few and usually slow in closing. The Treadwell Engineering Company, Easton, Pa., which had in contemplation the purchase of a few machine tools and which sent out inquiries, will not buy at this time for the reason, it is understood, that the necessary appropriation has not been made by the directors of the company. One feature of the market that has been commented on is the many offerings of second-hand machinery, but buyers of used machines are few also.

The Turner Construction Company, 11 Broadway, New York City, has been awarded the general contract for the erection of a reinforced concrete factory building, 70 x 457 ft., five stories, for the New York Consolidated Card Company, at Webster avenue and Fourth street, Long Island City.

The Lang Rewinder Company, Olean, N. Y., has completed plans for an iron work and machine shop building, to be erected next spring. Carl Lang is president.

The Curtis Machine Corporation, Jamestown, N. Y., has let contracts for the erection of an addition to its factory building, to be 60 x 160 ft., two stories and basement.

The D. H. Grandin Milling Company, Jamestown, N. Y., whose mill on East First street was destroyed by fire, November 9, with a loss of $30,000, on building and machinery, will rebuild at once on a new site on Allen street.

The Gicord Wood Company, Hudson, N. Y., will build a 75 x 100 ft. brick and steel addition to its plant.

The extensive sawmill plant of Frederick W. Kruse, Fredonia, N. Y., destroyed by fire November 12, will be rebuilt and equipped early next spring.

Henry Schmeer, manufacturer of boxes, etc., Syracuse, N. Y., will erect a box factory, 50 x 100 ft., two stories, at West Willow and Clinton streets, to cost $25,000.

The Board of Supervisors, Schenectady County, Schenectady, N. Y., is receiving bids on revised plans for a water supply system, including dam, pumps and piping.

The Parish Knitting Company, Parish, N. Y., has been incorporated by William Gee, William Spanswick and Albert T. Jennings, and will equip a plant for the manufacture of hosiery.

The Imperial Wall Paper Company, Glens Falls, N. Y., is building a three-story and basement factory building, 65 x 200 ft., to cost $35,000.

The Cork Helmet Company, Brooklyn, N. Y., has completed plans for the removal of its Brooklyn plant to Niagara Falls, N. Y., and for the removal of its present Canadian branch plant at Toronto to Niagara Falls, Ont. The move is made to facilitate the management of both plants from one executive office, to be at Niagara Falls, N. Y. Charles F. Lehman is manager.

The Cataract Knitting Company, Niagara Falls, N. Y., has been incorporated by Isaac Traub, Edward Delahunt, Albert Gold and Lewis Brown, and will build a manufacturing plant.

The Empire Engineering Corporation, Buffalo, has been awarded the contract for the construction of a new dry dock at the plant of the Buffalo Dry Dock Company on Buffalo River at Ganson street. The new dock will be 402 ft. long, 96 ft. wide at the top and 58 ft. wide at the bottom, of timber construction, and will replace the old No. 3 dock. The cost will be $100,000.

The Crystal Ice & Cold Storage Company, Buffalo, is remodeling and enlarging its ice manufacturing and storage plant on Spring street, near Broadway.

Francis G. Ward, commissioner of public works, No. 1 Municipal Building, Buffalo, is receiving bids for furnishing, setting up and connecting the mechanical equipment and scientific apparatus required in the new Technical High School at Bennett Park, Eagle and Clinton streets.

The Clover Leaf Milling Company will rebuild its mill, which was recently destroyed by fire, on Babcock street and the Pennsylvania Railroad, in addition to building a 13-story elevator and mill at Toisul street and the New York Central Railroad.

The Houk Mfg. Company, Inc., Buffalo, has been incorporated with a capital stock of $800,000 by G. W. Houk, Overbrook, Pa.; E. M. Mills and C. H. McCullough, Buffalo. The new corporation will take over and continue the business of the McCue Company, manufacturer of automobile axles and gears, and will add to it the manufacture of wire spoke wheels for automobiles. The company has an extensive plant at Elmwood avenue and Grote street and the New York Central Railroad.

The Economic & Sanitary Liquid Cooling Com-

pany, Inc., Buffalo, has been incorporated with a capital stock of $50,000, and will manufacture devices for cooling liquids. C. H. W. Auel, W. F. Kasting, W. C. Tenjost and I. C. Collins, Buffalo, are the directors. For the present the apparatus which the company will supply will be made under contract. Later on a manufacturing plant may be established.

The Erie Malleable Iron Works, Erie, Pa., will take bids about January 1 for an addition to its plant, 120 x 200 ft., one story. The estimated cost is $100,000.

New England

BOSTON, November 18, 1913.

Dealers and manufacturers agree that the machinery trade is dull. Shops which have continued busy beyond the experience of those of fellow machine tool builders have experienced a sharp letting up in the past fortnight. While the men intimately associated with the industry find it difficult to be hopeful, their customers see some bright spots on the horizon. For example, in the local pig-iron market, while buying is not heavy, almost every order is for immediate delivery. Generally speaking no one has any stock on hand, and few are buying for the first quarter of 1914. In this section of the country this is typical of practically every commodity, including supplies, that enters into the metal industry. Naturally, machinery lines feel the condition more acutely than others. From them it grades upward. The electrical industry, the various metal specialties, hardware and other branches of the trade are hit not nearly so hard. One hears comment that the promised easier money market is not distant. The banks have it in their power to give a stimulus to business by accepting the paper of manufacturers who wish to go ahead with plans for improvements. The railroads would spend money upon needed replacements and improvements should the 5 per cent. freight advance be given them, a demand now generally conceded to be just, and therefore probable of enactment into practice. Some observers are characterizing the present condition of business as a "hold-off" rather than a depression. Some significance may be attached to the fact that the Hendee Mfg. Company, Springfield, Mass., builder of motor cycles on a very large scale, has just increased its production to that of a regular night and day shift, following a period in which the factory has been running until 9 o'clock evenings. These works have been greatly increased in the past year. A local newspaper statement from Pittsfield, Mass., is that while the plant there of the General Electric Company has been increased in capacity 25 per cent. in the year, the reduction in output from that basis is not greater than 15 per cent.

The Worcester Pressed Steel Company, Worcester, Mass., has increased its capital from $100,000 to $200,000. The company's business has grown rapidly and the plant has been increased in a large way of late. The latest addition to be undertaken is a cold rolling mill, 90 x 150 ft., one story, with high monitor roof. Construction will be completed this winter.

Worcester, Mass., will have another large industrial building, which will be rented to manufacturers. Plans call for a structure 100 x 218 ft., eight stories, of reinforced concrete. The location will be the corner of Central and Commercial streets. The statement is made by Maurice F. Reidy, Worcester, who is at the head of the project, that 110,000 of a total of 144,000 sq. ft. of proposed floor space has already been leased.

J. W. Conway, Hartford, Conn., will build an addition to his foundry, 44 x 46 ft., one story.

The E. F. Hunt Company, Worcester, Mass., manufacturer of builders' finish, will double its plant by the erection of a one-story building, 100 x 100 ft., designed to receive an additional story later.

The Locke Steel Belt Company, Bridgeport, Conn., has purchased land on Bishop avenue upon which it proposes to erect a factory in the spring. The works will consist of a main building 80 by 200 ft., one story, with several auxiliary structures.

A press dispatch states that the Lake Torpedo Boat Company, Bridgeport, Conn., has notified the Navy Department that it is not able to complete the contracts for five submarines now in process of construction. Plans for a reorganization of the business are under way.

The Neptune Hardware Company, East Norwalk, Conn., will erect a brick factory building, 60 x 200 ft., one and two stories.

The Waterbury Clock Company, Waterbury, Conn., will erect an additional building, 50 x 182 ft., five stories, of brick, mill construction.

Plans for additions to general manufacturing plants in New England include the following: S. Slater & Sons, Webster, Mass., textiles, addition 132 x 175 ft., four stories and basement; Sheffield Dentifrice Company, New London, Conn., addition to factory, 80 x 100 ft., four stories, brick, mill construction; Weber Piano Company, Worcester, Mass., addition to factory; S. A. Felton & Son, Manchester, N. H., addition; Beacon Mill, New Bedford, Mass., addition to works.

Philadelphia

PHILADELPHIA, PA., November 17, 1913.

The market is dull with no betterment in the demand. Some merchants report current small sales as being lighter. With some firms business so far this month has been almost negligible. The larger industrial plants, possible buyers of equipment, are steadily growing less active and therefore without inducement to purchase additional equipment. Railroad purchases have been at a minimum and little business is in sight. The outlook is not considered bright, it being expected that little buying of tools of any importance will develop until after the turn of the year. A moderate although scattered business in power equipment continues to develop. Second-hand machinery is uniformly dull. Makers of gray-iron castings are beginning to feel a decreased demand, while steel-casting plants have made little if any gain in volume of business.

The Henry Goldner Boiler & Tank Works, Water and Mifflin streets, which has been conducted as a copartnership, has been incorporated with a capital stock of $15,000. Henry Goldner is president and Charles F. Wise is secretary-treasurer. No immediate improvements are contemplated.

Engineers have plans under way for a factory building and weave sheds to be erected for H. G. Fetterolf at Stenton avenue and Louden street. Details are not available, but it is understood that the factory will be three stories and have approximately 55,000 sq. ft. of floor space.

Fire badly damaged the woodworking plant of the Kensington Wood Turning Company, 1939 East York street, on November 15. Details as to the damage and plans of the company are not yet available.

The shipbuilding plant of John H. Dialogue & Co., Camden, N. J., one of the smaller Delaware River yards, was placed in the hands of a receiver last week. Henry J. Stockwell, Camden, N. J., was appointed receiver and will temporarily operate the plant. Several vessels are in course of construction at the plant.

The Pottstown Steel Company, Pottstown, Pa., is being organized by Jesse R. Evans, attorney, and John B. Evans, of Pottstown, Pa., and S. S. Lenhart, of Reading. The company plans to establish a plant in the near future, between the tracks of the Reading and Pennsylvania railroads at Pottstown. Details are not available as yet.

Ballinger & Perrot, engineers, have completed plans for three additional buildings to the plant of the Viscose Mfg. Company, Marcus Hook, Pa. The additions comprise a manufacturing building, 135 x 423 ft., one and two-story, with saw tooth skylight roof; a five-story building, 78 x 152 ft., of reinforced concrete and brick, windows of metal frame; and a one-story and basement building, 117 x 173 ft. Bids are now going in on the erection of these buildings.

The Watts Engineering Company is preparing plans and specifications for the installation of an electric light and power plant to be installed at Scranton, Pa., for the Eureka Power Company.

The contract for the erection of a one-story ice manufacturing plant for the Merchants' Ice Company, Reading, Pa., from plans by the York Engineering Company, York, Pa., is said to have been awarded to Fink & Seidel, Reading, Pa.

Plans are being prepared for a large addition to the Ripka Mills of the A. T. Baker Company, Main and Carson streets, Manayunk. The proposed building will be four stories, 65 x 200 ft. Sauer & Hahn are the engineers.

The National Machine & Vise Company, Wilmington, Del., has been incorporated with a capital stock of $1,000,000 by F. W. Buck, George W. Dillman and B. M. Greval, all of Wilmington, Del.

Chicago

CHICAGO, ILL., November 17, 1913.

The Board of Education of this city opens bids to-day on an attractive list of machines for the manual training departments of several schools. It includes a good number of lathes and runs into liberal figures. Machine tool manufacturers all find themselves in pretty much the same situation as the result of the light business prevailing, and the average shop is operating on materially curtailed schedules. A Western tool builder has just received an order for a $7000 milling machine from a Detroit automobile manufacturer and another Detroit builder of low-priced cars has distributed what are the largest single orders for equipment of one class ever placed. In other directions the available new business is very scattering.

The Triple-Action Spring Company, Chicago, has been incorporated with a capital stock of $150,000 by G. W. Drake, J. G. George, and T. J. Hodge, to manufacture special appliances and machinery.

The A. C. Torbert Equipment Company, Chicago, organized by A. C. Torbert, F. A. Farnham and Nathan S. Symser, has been incorporated with a capital stock of $10,000.

The Federal Name Plate Company, Chicago, incorporated with a capital stock of $10,000 by Michael L. Schults, Charles L. Nusbaumer, and Samuel S. Holmes, will operate a plant equipped to make castings and stampings.

The Irving Park Sash & Door Company, 4256 North Crawford avenue, Chicago, suffered a loss estimated at $40,000 as the result of a fire November 9.

C. F. Claussen & Son has taken out a permit to erect a three-story brick factory, 86 x 140 ft., on Western avenue, Chicago.

The W. A. Jones Foundry & Machine Company, Elston and North avenues, Chicago, manufacturer of transmission machinery, will build a one-story brick shop, 75 x 140 ft., at 1310 South Kostner street, to cost $8500.

The Oscar Heineman Company, silk manufacturer, Chicago, has had plans prepared for the erection of a four-story factory, 98 x 119 ft., at Armitage and Fairfield avenues, the estimated cost being $15,000.

J. C. Doyle, Chicago, has had plans prepared for the remodelling of a four-story manufacturing building, 50 x 125 ft., at Ashland avenue and Walnut street, the improvements costing $20,000.

Plans for a one and two-story brass foundry to be erected at Fulton and Ann streets, Chicago, are being prepared in the office of C. F. Sorrensen, architect, Stock Exchange Building, Chicago.

The Grant Baking Company, Chicago, will erect at 3021 West Lake street a $40,000 one-story brick bakery, 125 x 145 ft.

The Schulze Bakery Company, Chicago, will erect at 509 South San Francisco street, a one and two-story garage, 65 x 75 ft., at an estimated cost of $25,000.

The Gem City File Works, Quincy, Ill., has been organized with a capital stock of $60,000 by R. C. Bickhaus, H. H. Bickhaus, and F. J. Penick, to engage in the manufacture of files.

A reorganization of the Bonner Mfg. Company, Champaign, Ill., whereby C. E. Bonner has acquired a controlling interest, will be followed by the incorporation of the Bonner Tool Company, which has secured the plant of the Danville Car Company at Danville, Ill. This plant will be properly equipped for the transfer of the business from Champaign and will afford a much increased capacity for the manufacture of drop-forged tools.

John L. Fisher, Peoria, Ill., is preparing to erect a small factory for the manufacture of the Fisher horseshoer's vise.

L. L. Graves, Streator, Ill., is preparing to replace his present iron foundry buildings with a fireproof structure, 50 x 100 ft. The equipment of the plant will be improved accordingly.

The city of Elgin, Ill., will install a steam turbine municipal lighting and pumping plant for which a bond issue of $162,000 is proposed and specifications are being prepared.

The Galva Electric Company, Galva, Ill., has been incorporated with a capital stock of $150,000 by E. L. Brown, E. O. Brown and others and plans to equip an electric plant.

The Bonner Drop Forge Company, Danville, Ill., has been incorporated by C. E. and C. M. Bonner and Harry Miller with a capital stock of $15,000.

The Hercules Gas Engine Company, Evansville, Ind., formerly of Sparta, Mich., has its new plant at Evansville completed, and is now installing machinery equipment. It expects to have the factory in operation before January 1.

The J. C. Smith Hoe & Tool Company's plant at Evansville, Ind., has been burned, with a loss of $17,000. The company will rebuild as soon as possible.

Harris Bros., Chicago, formerly the Chicago House Wrecking Company, have purchased the plant and equipment of the Cutting Motor Car Company, Jackson, Mich., from the receiver. It is the intention to operate the plant again.

The German-American Car Company, with offices in the Harris Trust Building, Chicago, and with a plant at East Chicago, Ind., has acquired a 10-acre site at Sands Springs, Okla., upon which a car shop will be erected and equipped.

The F. Starry & Sons foundry, Cedar Rapids, Iowa, was destroyed by fire November 8, with a loss of $20,000. The plant will be rebuilt and new equipment installed.

The C. & E. Mfg. Company, Marshalltown, Iowa, has been incorporated with a capital stock of $10,000 to manufacture a number of specialties, including a detachable jaw wrench. A. R. Cooper is president.

Bids will be received in December for constructing waterworks for Winfield, Iowa, from plans of the Des Moines Bridge Company, Des Moines, Iowa. J. O. Kilbourn is city clerk.

The Berger Bros. Mfg. Company, Minneapolis, Minn., has leased the property known as the Northwestern foundry, located at Tenth avenue S and First street, and has begun work on alterations and enlargements. The company expects to have the plant in operation after January 1.

The Kiel Mfg. Company, Albert Lea, Minn., has been incorporated with a capital stock of $50,000, to succeed the Oscillator Washer Company, manufacturer of washing machines. Peter P. Kiel is president. Martin Blacklin, Robert A. Wiegand, J. P. Kiel and A. J. Berglund are the other directors.

The Public Service Company, St. Cloud, Minn., has the contract for furnishing power and light for the Great Northern car shops at Waite Park, Minn., which have been operated by steam.

Bids will shortly be received for a deep well pump for Moorehead, Minn.

George Blaisdell, a local capitalist of White, S. D., has been granted a franchise by the City Council to install and operate an electric light and power plant.

Columbus, Mont., will install a waterworks system.

Milwaukee

MILWAUKEE, WIS., November 17, 1913.

Scattering inquiries based on buying immediately after the beginning of the new year have come in during the last week and improved the outlook to a slight extent. A few bookings of little consequence are reported but on the whole trade is dull. Collections are improving somewhat, and this is considered a good sign. Tool builders are in better shape than most machinery manufacturers, as far as production is concerned, for, while purchases are more spotty than in past months, there is a continuity of orders not found in other metal trades divisions. There seems to be no question that improvement of a substantial nature may be looked for after January 1.

The Northern Coal & Dock Company, a subsidiary of the Youghiogheny & Ohio, has acquired a large tract of dock property on the North Menomonee Canal at Milwaukee and will expend about $350,000 in the construction of a coal handling plant. J. L. McMahon is manager at Milwaukee.

John Flatz, who has been operating a foundry at Twenty-sixth avenue and Park street, Milwaukee, has organized a corporation under the name of National Foundry Company, with a capital stock of $10,000 to continue the business. John C. Harwig and Leo C. Flatz are associated in the enterprise with Mr. Flatz. The corporate name is the same as that which has been applied to the old business.

Karl Klauser and H. R. Manger, Milwaukee, have organized the Machinists' Supply Company, with a capital stock of $5000 and will deal in tools and instruments.

The Racine Metal Stamping Company, Racine, Wis., owned by Adam Falkenrath and Jerry Ritter, has started work on a new plant to replace the structure recently destroyed by fire. Spring hinges, steel dies and stampings for the trade are manufactured.

The Peterson Bolster Spring Company, Racine, Wis., has been incorporated with a capitalization of

$25,000 by George C. Peterson, W. C. Peterson and Martin Christiansen. Plans for a factory are now being prepared.

The Racine Boiler & Tank Company, Racine, Wis., has been incorporated by Henry L. Wratten, J. H. Fahy and William Tuebner to manufacture boilers, tanks, etc. The capital stock is $10,000. Mr. Wratten was for many years associated with the S. Freeman & Sons Company, and resigned several months ago to engage in business on his own account.

The Farm Tile & Gas Pipe Company, Racine, organized recently by J. Critchell French, H. O. Jacobsen and Ernest L. Makvricka to manufacture machinery for excavating and ditching, is negotiating for a site and plant at Burlington, Wis.

The fire department of Racine, Wis., will soon be in the market for a small list of miscellaneous tools and supplies for its new repair and machine shop. The list includes a 16 x 19 lathe, 24-in. drill press, bench vise, milling machine and shaper, dies, forge, anvil and complete set of wood and metal-working hand tools. James Cape is fire marshal.

Stockholders of the Augustyn Rotary Valve Company, Marshfield, Wis., recently incorporated with $50,000 capital to promote a rotary valve gasoline engine, has elected officers as follows: President, Dr. G. L. Harrington; vice-president, Charles K. Herrick; secretary, H. E. Hoerl; treasurer, R. J. Strauss. Edward Augustyn, Frank Trudeau and John McDonnell are the other directors. Plans for operation are now being considered.

The Kenosha Boiler Works, a partnership composed of A. H. Kluender, William G. Bloxford and F. G. Erickson, is about to become a corporation under the title of Kenosha Boiler Works Company. The company has broken ground for a new shop building on Division street, and is engaged in the manufacture of self-supporting steel stacks, tanks, heavy iron and sheet iron work, and structural work. The new shop will soon be finished and is so arranged as to facilitate future extensions.

The water and light commission of New London, Wis., is about to call for bids for furnishing and installing pumps and electrical drive for the new pumping station of the municipal waterworks system. W. G. Kirchhoefer, Madison, Wis., is supervising engineer.

F. J. Noetzel, W. H. Ristow and Bert Lewis, of LaCrosse, have organized the LaCrosse Motor Company, with capital stock of $10,000.

The Wisconsin Stable Equipment Company, Oconomowoc, Wis., has been incorporated with a capital stock of $30,000, by B. G. Edgerton and W. P. Moldenhauer, to manufacture agricultural machinery. E. F. Thompson, F. E. Flood and George W. Warr, of Oconomowoc, are large stockholders.

The Chippewa Valley Railway, Light & Power Company, Eau Claire, Wis., is making surveys and preliminary plans for the construction of a hydro-electric plant which it proposes to build at Paint Creek, Chippewa River, next spring. The probable cost is $500,000. George B. Wheeler is president.

Business men of Fall Creek, Wis., are organizing a company to build a dam and establish a small hydro-electric plant at Kopplin, Fall Creek, to develop about 100 hp. and sell current to the village and business houses. Among those behind the movement are James H. Groghan, P. O. Vogler, Ludwig Schultz and Charles Hoehn, all of Fall Creek.

The Hancock Light & Power Company, Hancock, Wis., is purchasing the equipment for its electric plant, including a 75-hp. engine and generator. R. H. White is president.

The A. E. White Machine Works, Eau Claire, Wis., has started the manufacture of saw swages and swage shapers for the sawmill trade on a large scale and expects to double its capacity for the production of these tools before January 1. Some equipment is being purchased as needed. A. E. White is proprietor.

The Douglas County Board of Supervisors, Superior, Wis., will be in the market early in the spring for tractors, graders, stone crushing and rolling machinery for the use of the county highway commissioner.

M. Costello, county highway commissioner, Fond du Lac, Wis., has asked the county board of supervisors to provide funds for the purchase of one steam roller, one large concrete mixer, two stone crushers and a list of miscellaneous tools for the permanent highway project. The list will amount to $5000.

William Smiley & Son, of Minneapolis, Minn., who recently purchased from the Midland Lumber Company, the foundry and machine shop at Chippewa Falls, Wis., formerly operated by F. G. & C. A. Stanley, have started operations in the foundry and are filling large orders for castings for local and outside manufacturers. The machine shop is being overhauled and the equipment rearranged and it is intended to start operations in this division about February 1. The new owners intend to manufacture gasoline traction engines and other agricultural power machinery and will buy tools and machinery for this purpose immediately after January 1.

Cleveland

CLEVELAND, OHIO, November 18, 1913.

Business in machinery lines during the week continued dull, being limited almost entirely to single tool orders. It took several days for the city to recover from the effects of the blizzard, which brought business to a standstill early last week. Many manufacturing plants that closed down Monday did not get started up again until Friday, suspension of operation being necessitated because workmen were unable to get to their places of employment on account of the crippled street car service, and in some cases because there was a scarcity of coal. The Lake Shore Railroad is expected to purchase shortly machine tool equipment and air compressors for its new steel car repair shops in Ashtabula, Ohio. Inquiry for second-hand machinery is fairly active. The demand for steam and gas engines is dull.

Bids will be received by the Director of Public Service, Cleveland, December 4, for boiler feed pumps for the municipal lighting plant.

Theodore Schmitt, of Lehman & Schmitt, architects, Cleveland, will build a large garage for public service on East Eleventh street, Cleveland.

The Carl Electric Vehicle Company, recently incorporated with a capital stock of $300,000, has purchased the machinery and good will of the Chicago Electric Company and will move that company's equipment to Toledo as soon as vacant factory property is acquired for a site. C. A. Neracher, formerly chief engineer of the Willys-Overland Company, is one of the principal organizers of the new company.

Bids will be received by the Director of Public Service, Akron, Ohio, December 2, for equipment for a new waterworks pumping station. This equipment will include one motor-driven high lift centrifugal pumping unit, one combined steam turbine and motor-driven low lift centrifugal pumping unit, one steam turbine driven generator unit, switch board, transformers, etc.

The Buckeye Aluminum Company, Wooster, Ohio, has placed contracts for the erection of a two-story addition, 60 x 85 ft., to provide additional manufacturing space.

The Superior Metal Products Company, Elyria, Ohio, has awarded the contract for the erection of a plant addition, 40 x 41 ft.

The Willour Mfg. Company, Ashland, Ohio, has been incorporated with a capital stock of $30,000 by Leroy Willour and others to manufacture plumbers' supplies.

Bids will be received by the Board of Public Affairs, Caldwell, Ohio, November 24, for equipment for rebuilding and remodeling the municipal electric light and waterworks plant. The new equipment to be bought will include a 120-hp. vertical multi-cylinder natural gas engine to drive the present generator, and an 80-hp. single cylinder horizontal natural gas engine to drive the pump. The present compound steam pump will be changed into a belt-driven pump or replaced with a new belt-driven power pump. Other new equipment will include a switch board.

The Fulton Drop Forge Company, Canal Fulton, Ohio, is enlarging its plant by the erection of an addition, 30 x 60 ft. Some new equipment will be installed, including shears and hammers.

The Board of Trade, of Warren, Ohio, has closed a deal for the location in that city of a plant for the manufacture of inner tubes for automobile tires. The company, now located in Chicago, will occupy the plant of the Lyman Pail factory.

The Knight Tire & Rubber Company, Canton, Ohio, has commenced the erection of factory additions. These will include a three-story building, 75 x 125 ft., and a two-story building, 55 x 125 ft. The buildings will be of reinforced concrete construction.

The United Gas Arc Light Company is the name of a new company in Toledo, Ohio, which will manufacture gas mantles and various gas appliances. Max Benjamin is president.

Detroit

DETROIT, MICH., November 17, 1913.

The local machine tool market shows no improvement. Business the past week has been extremely irregular, with transactions almost entirely confined to single tools. There is some new inquiry before the trade but not in sufficient volume to lead to any expectation of material betterment in conditions and in fact not much change is looked for by dealers until after the new year begins. General business and industrial conditions are fairly good and manufacturers are operating pretty nearly on a normal basis. The second-hand machinery market is quiet, with good sized stocks on hand. Foundries are fairly well engaged. Building operations have slackened and new work reported is chiefly of a minor character.

The F. J. Stroup Printing Company, Detroit, has acquired additional shop quarters and will install a large amount of new equipment, some of which has already been contracted for. The capacity of the plant will be doubled.

The low figures submitted for the plant and equipment of the R-C-H Corporation, automobile manufacturer, at the receiver's sale, November 11, resulted in the rejection of the bids and another sale will probably be arranged for by the receiver, the Security Trust Company.

The Crucible Steel Company of America has begun the erection of a one-story brick warehouse, 73 x 130 ft., on Lafayette boulevard, Detroit.

The VanBlerck Motor Company, 137 Lieb street, Detroit, Mich., will occupy a new $15,000 factory at Monroe, Mich., on December 1. The company will turn out medium duty and high speed marine engines and plans to develop other gasoline engine lines later. The company advises that it is in the market for tools, such as drills, cutters, etc., and also for many tool machine products and various motor parts, piston rings, bronze castings, both rough and machined, copper tubing, etc. Owen Ruppey is secretary.

It is announced from Monroe, Mich., that the River Raisin Paper Company will erect additions to its plant of sufficient size to double its present capacity.

The Stack Lumber Company, Escanaba, Mich., has been incorporated with a capital stock of $1,500,000. The company owns extensive tracts of timber which will be exploited by the erection of a large sawmill plant.

Plans are being prepared for the erection of additions to the plant of the Morgan Salt Company, Ludington, Mich. A new boiler house and equipment are among the improvements.

The Michigan Central Railroad has broken ground for the erection of its new shops at Bay City, Mich. The shops will be used for car rebuilding and repair and a large machine shop will also be erected.

The Jackson Gas Engine Company, Jackson, Mich., has been incorporated with $10,000 capital stock to manufacture gasoline engines. George A. Vandercook and Arthur Johnson are the principal stockholders.

The Henry Rowe Mfg. Company, Newaygo, Mich., manufacturer of dowels, turnings, handles and special woodwork, is to build a plant on the Pere Marquette Railroad. W. J. Bell is president and Henry Rowe, secretary and manager.

Cincinnati

CINCINNATI, OHIO, November 17, 1913.

No general improvement in the machine tool trade appears, although it is rumored that several makers have secured a few more domestic orders than during the previous week. Some of this business is understood to have come from a large technical school in Chicago, which quietly circulated a list several days ago. Neither the automobile manufacturers nor the railroads are now doing any purchasing, except a few tools for urgent replacement needs. The export business is unchanged, with only spotty buying. Second-hand machinery continues to show a little improvement, with the majority of orders coming from the South. The severe storms of the previous week caused a shutdown of a number of plants in Columbus, due to a scarcity of coal, but they are all now operating.

Foundations will soon be ready for the electrical equipment for the new 12-story steel building, now under construction at Fourth and Hammond streets, Cincinnati, for the Bell Telephone Company. The Devere Electric Company was the successful bidder for the equipment estimated to cost nearly $40,000.

The E. H. Huenefeld Company, Cincinnati, has purchased the former plant of the Schacht Motor Car Company on Spring Grove avenue. One of the three-story buildings adjoining the Huenefeld Company's plant will be fitted up for the manufacture of cooking ovens, stove piping, etc.

The Withrow Mfg. Company, Cincinnati, has leased from the E. H. Huenefeld Company a large building on Spring Grove avenue, to be used for the manufacture of household specialties and go-carts. Very little extra equipment will be required.

It is reported that the Perkins-Campbell Company, Cincinnati, has under consideration the erection of a large tannery and saddlery manufacturing plant on Spring Grove avenue. No details are yet available.

The International Harvester Company will soon call for bids for the construction of a reinforced concrete building to be erected at Sixth street and Eggleston avenue, Cincinnati. The proposed structure will be 60 x 125 ft., six stories, and of reinforced concrete construction. It will be used for warehouse purposes, but considerable electrical equipment will be required in addition to construction materials.

On November 10 fire almost completely destroyed the plant of the Boss Washing Machine Company, Norwood, a Cincinnati suburb. The estimated loss is $75,000, partially covered by insurance. Rebuilding operations will begin as soon as insurance adjustments can be made. The company has a foundry at Hamilton, Ohio, and does a large domestic and export business in different types of washing machines and other specialties.

The Mitchell Furniture Company, Cincinnati, will install new boilers in its plant on Second street. Walter G. Franz is the consulting engineer in charge.

Samuel Hannaford & Sons, Cincinnati, have completed plans for a three-story manufacturing building 50 x 210 ft., to be erected at Chillicothe, Ohio, for the American Patent Pad & Textile Company. Mention of these plans was made some time ago.

Power plant equipment will be required for the City Infirmary, Springfield, Ohio. Bids will be received until November 25. George E. McCord is president of the board of directors.

The press reports state that the South Webster Brick Company, South, Webster, Ohio, has plans under way for a branch plant to be erected on a site secured near Wellston, Ohio.

It is reported that the A. T. Nye & Sons Foundry Company, Marietta, Ohio, is considering making some additions to its plant. W. T. Mills, Columbus, Ohio, is the architect.

The contract for the assembling plant of the Ford Motor Company, to be erected at Columbus, Ohio, has been awarded to the National Fireproofing Company, Pittsburgh, Pa. Work will be started at an early date if weather conditions permit.

The Wing & Myers Foundry Company, Columbus, Ohio, has been incorporated with $20,000 capital stock to deal in all kinds of iron and steel products. C. H. Wing and S. C. Myers are the principal incorporators.

The Central South

LOUISVILLE, KY., November 17, 1913.

Business in the machinery field continues abnormally quiet. Apparently few purchases are made that can be avoided. Machine tools are in slow demand, and boilers and other power equipment are also moving poorly. The conservative tone of business appears to be deepening, although most of those in touch with manufacturers anticipate renewed activity later on. At present, however, sales are confined to goods actually needed, improvements and new work being held down to the minimum.

Charles Schwartzel, Louisville, will erect a two-story brick factory for the manufacture of baskets, and will be in the market for the necessary special and power equipment for that purpose. The estimated cost of the plant is $7500.

The Hillenbrand Brick Company, Louisville, is considering enlarging its plant. The contemplated improvements will not be made until 1914.

The Culley Cement Block Company, Louisville, has purchased a building to be used as a branch plant, and will purchase special equipment for it in the next few weeks.

The flour mill of M. T. Enos, New Albany, Ind., a Louisville suburb, was burned recently with a loss of $5000 to the equipment, which was motor driven. The building was under lease.

Thomas & Whitton, Louisville, are the contractors on a garage building which will be built by Mrs.

Jennie Withers Smith, of Lexington, Ky. The Commercial Auto Company will occupy the building, and a complete repair shop will be equipped.

The Central Motors Company, Owensboro, Ky., recently incorporated, will operate a garage and repair shop in that city. Elmer Little and William R. Cavin are the principal stockholders.

The city of Marion, Ky., recently voted bonds for the construction of a waterworks system, and work will begin shortly. Dr. George W. Stone is the mayor.

C. P. Hall, Shelbyville, Ky., is having a garage constructed and will be in the market for machinery for the equipment of a repair shop in connection with it.

R. M. Arnold, Danville, Ky., is contemplating extensive improvements to his buggy factory and repair shop in that city at an early date, and will be in the market for woodworking and other machinery.

The D. T. Bohon Company, Harrodsburg, Ky., will purchase power equipment and special machinery for a new factory which is under way.

M. M. Daviess, Harrodsburg, Ky., will shortly begin the construction of a cabinet and screen factory, and will be in the market for machinery for its operation.

The Campbellsville Public Utilities Company, Campbellsville, Ky., has been incorporated with $25,000 capital stock to erect a lighting and ice plant. T. M. Estes, Lebanon, Ky., is named as one of the principal incorporators.

Nickey Bros. & Bass, Memphis, Tenn., have let contracts for the equipment of their new veneer mill. Four veneer saws and a 16-ft. slicer are to be installed by the Capital Machine Company, Indianapolis. Chandler & Taylor, Indianapolis, have furnished two boilers, with a capacity of 300 hp., and two engines with a capacity of 225 and 105 hp. The electrical equipment, including generator and motors, is to be installed by the Allis-Chalmers Mfg. Company. The Buffalo Forge Company has put in a fan, which is of unusual size, being 44½ in. in diameter. The contract for the drier was let to the Philadelphia Textile Machine Company. The plant is one of the most modern of its kind in the South, steel and concrete being used in its construction, most buildings of this type making little pretense to being fireproof. This is one of the few veneer plants in the South which has motor-driven saws.

Birmingham

BIRMINGHAM, ALA., November 15, 1913.

Comparatively slack operations in industrial plants and a general indisposition to expend money except for actual wants have resulted in a falling off of new business in machinery lines. Second-hand machinery is selling in fair lots for small plants and prosperity in agricultural districts continues to evidence itself in such supplies as country merchants carry. Gasoline engines are in steady demand.

The Tidewater Securities Company, Birmingham, announces the completion of purchases on Dauphin Island, near Mobile, and the securing of capital to build coaling stations, etc., at an expenditure of $500,000. J. M. Dewberry is president of the company.

The Interstate Oil & Fertilizer Company, Birmingham, Ala., has been incorporated by John G. Cooke, the president, and others, with a capital stock of $100,000. It is proposed to establish oil mill and fertilizer mixing plants at several points, with the central plant in Birmingham.

W. L. Sibley, Birmingham, Ala., heads a movement to establish a brick and tile plant at Tuscaloosa, Ala.

The Richardson Lumber Company will build a lumber mill to cut cedar logs at Russellville, Ala.

J. D. Springer will establish a sawmill of 30,000 ft. capacity at Northport, Ala.

The plant of the Standard Chemical & Oil Company at Troy, Ala., was burned with a loss of $20,000, partly covered by insurance. The plant will be rebuilt.

The hydroelectric plant being built by Charles Henderson on the Pea River, near Elba, Ala., is nearing completion. It will have 2500 hp. and will supply the towns of Troy, Elba, Enterprise, Opp and Andalusia.

The Griggs Fertilizer Company, Doerun, Ga., has been incorporated with a capital stock of $15,000 by W. O. Beard and E. L. Bacon, of Doerun, and T. N. Stewart, of Atlanta. The company will build a factory.

D. Y. Hodges and associates will establish a fertilizer factory at Loganville, Ga.

The American Fertilizer Company, Savannah, Ga., will build a fertilizer factory with a capacity of 300 tons.

St. Louis

ST. LOUIS, MO., November 17, 1913.

The machine tool market continues quiet, with most of the business of minor character, but making a reasonably good aggregate. Dealers do not expect any particular change for the remainder of the year at least, because of the timidity of capital. Some replacement is going on and there is, as usual, some request for single tools, while a few second-hand tools are being disposed of. Collections are reported fairly satisfactory.

The St. Louis Well Machine & Tool Company plans to build, besides a 40 x 175-ft. machine shop, to cost $12,000, a blacksmith shop, 40 x 75 ft.; a warehouse, 30 x 50 ft., and a power house, 30 x 30 ft. The machine shop and warehouse are to be of steel, concrete and glass; the blacksmith shop of steel and corrugated iron, and the power house of concrete and hollow tile.

The Linde Air Products Company, Buffalo, N. Y., will establish its factory No. 11 at East St. Louis, but the company has not yet determined when this plant will be erected.

The Pneumatic Devices Company, St. Louis, has been incorporated with a capital stock of $50,000 by Nelson S. Gotshall, H. B. Graham and others and will equip a plant for the manufacture of a patented door opener and closer and other pneumatic devices.

The Three Kays Company, St. Louis, has been incorporated with a capital stock of $20,000 by A. S. Olin, Edward Mendelsohn, and others to equip a plant for the manufacture of carbon cleaning compounds and devices for gasoline and other engines.

The Taylor Bros. Churn & Mfg. Company, St. Louis, has been incorporated with a capital stock of $50,000 by John E. and Thomas G. Taylor and John M. Hannibal, to manufacture churns, etc.

The William M. Clancy Plumbing, Heating & Construction Company, St. Louis, has been incorporated with a capital stock of $15,000 by William M. Clancy, Richard Hanlon and E. C. McGrath, and plans to equip a plant for manufacturing heating appliances.

The American Factories Company, St. Louis, has been incorporated with a capital stock of $50,000 by W. E. Graves, C. L. Clark and L. J. Brooks, Jr., to engage in general manufacturing.

The Schram Glass Mfg. Company, St. Louis, is equipping a glassware manufacturing plant at Sapulpa, Okla., to cost about $175,000, the equipment amounting to about $125,000 of the total.

A 10-ton refrigerating plant and a two-ton ice machine are to be installed in St. Luke's Hospital at St. Louis.

The Walter A. Zelnicker Supply Company, St. Louis, is reported to be in the market for a narrow gauge locomotive of 30 to 40 tons, with 40 to 44-in. drivers.

The Bowers Mill Implement Company, Bowers' Mill, Mo., has been incorporated with a capital stock of $15,000 by A. W. Edwards, G. R. Goss and R. J. Smith, to manufacture special devices.

An ice plant is contemplated at Centralia, Mo., by C. E. Shock, who is obtaining estimates on the machinery required.

The Edina Light Company, Edina, Mo., has plans for the installation of a 152-hp. engine and 150-hp. boiler, together with other necessary equipment for a public service light plant.

The La Plata Light & Power Company's electric light plant, waterworks and ice factory, La Plata, Mo., have been bought by Abraham Vogel, of La Plata, who is understood to have plans for adding to the equipment.

A Corliss engine direct connected to a 200-kw., 3-phase, 60-cycle, 2300-volt generator is planned to be installed by the Fayette Light, Ice & Coal Company, Fayette, Mo.

The Lewistown Light Plant & Mill Company, Lewistown, Mo., is in the market for oil engine equipment. J. S. Heavenridge is manager.

The Valley Park Distillery, Valley Park, Mo., has been incorporated with a capital stock of $75,000 by Joseph T., Raymond and William Fritschle, and will equip a distilling plant.

The Higginsville Brick & Tile Company, Higginsville, Mo., has been incorporated with a capital stock of $25,000 by V. P. Goodale, and F. P. and B. T. Canterberry, and plans to equip a brick and tile manufacturing plant.

The Russellville Plumbing Company and the Russellville Iron Works, Russellville, Ark., have been consolidated and reorganized with W. J. White as president and T. F. Hoye as general manager. The two plants will be remodeled.

A cold storage and ice plant, for warehouse purposes and also for icing cars, will be equipped at Fort Smith,

Ark., by R. Schneider and J. W. Morris, at a total cost of about $60,000.

Plans for a refrigerating plant for the City Market & Arcade Company, Little Rock, Ark., are being prepared with the purpose of installation as soon as the building is ready.

An ice plant to cost about $10,000 is planned for Lonoke, Ark., by J. W. Fuller, who has begun the organization of a corporation therefor.

The Morse Land & Timber Company, St. Louis, incorporated by E. A. Morse and others, will equip mills in Jackson County, Ark., to develop about 6000 acres of timber land.

A saw mill is to be equipped at Harrisburg, Ark., to develop timber acreage bought there by Stirits Bros.

The Kensett Lumber Company, Kensett, Ark., has been incorporated with a capital stock of $15,000 by Fred W. Hall, Ed Dickey and William Abernethy, and will equip a mill.

The Best-Clymer Mfg. Company, St. Louis, has completed its plans for the equipment of a sorghum plant at Fort Smith, Ark., to cost about $75,000 with equipment.

A plant for interior woodwork manufacture will be erected at Little Rock, Ark., by the Chamber of Commerce for Sandberg Bros., of Chicago. The equipment will cost about $8000, in addition to the building.

The town of Devol, Okla., will install a waterworks system, including power pump, oil engine, etc. W. T. Huff, clerk, is in charge.

The Motor Gasoline Company, Muskogee, Okla., is in the market for an electric light plant for isolated use and a 100-hp. gas engine.

The Tulsa Packing Company, Tulsa, Okla., has been reorganized with $125,000 capital, and will equip a plant on a site which has been obtained. J. H. Crimmins, H. P. Anderson and O. C. Boone are interested.

The Western Foundry & Machine Company, Okmulgee, Okla., F. H. Ott, manager, will rebuild and reequip that portion of the plant recently destroyed by fire. Equipment to cost $5000 will be installed.

The city of Marietta, Okla., will equip a waterworks plant, to cost about $20,000, under the direction of F. S. Smedley, Muskogee, Okla. The Benham Engineering Company, Oklahoma City, will supervise the work.

The Y. T. Eggleston Feed Mill Company, Greenwood, Miss., has been incorporated with a capital stock of $10,000 by Y. T. Eggleston, Sam J. Stein and others.

The Green County Lumber Company will equip a mill for the development of timber acreage in the vicinity of Bexley, Miss.

The Louisiana Timber Company will remove the saw and planing mills of Coney & Crosby, Hazlehurst, Miss., to Red Lick, Miss., enlarge them and develop 9000 acres of timber land.

The Ruby Lumber Company, Geren, Miss., has been incorporated with a capital stock of $25,000 by J. A. Hull, T. E. Courtney and others and will establish a mill.

The Merrill Lumber Company, Canton, Miss., is reported as having plans for a large mill and a logging railroad, to cost in all about $300,000.

The Hattiesburg Wood Reduction Company, Hattiesburg, Miss., will rebuild on a considerably enlarged scale the plant which was recently burned with a loss of about $57,000.

W. A. Hall, Magnolia, Miss., is preparing to install new machinery to take the place of that recently wrecked by a boiler explosion at his saw mill, cane mill and cotton gin.

The Scranton Shingle Company will install a veneer mill at Pascagoula, Miss. Edward B. Martin is president and general manager.

The Lutcher Ice & Light Company, Lutcher, La., has been incorporated with a capital stock of $25,000 by R. J. Younger, J. A. Daspit and others, and plans to equip a public service plant.

The city authorities of New Orleans, La., are considering the construction of a municipally owned and operated electric light and power plant.

The Louisiana Artificial Ice & Cold Storage Company, Baton Rouge, La., will equip a cold storage department, the equipment to cost about $20,000.

The Ferd Brenner Hardwood Mill Company will equip a hardwood lumber mill at once at Alexandria, La., it is stated.

The W. F. Johnson Lumber Company, Shreveport, La., has been incorporated with a capital stock of $25,000 by W. F. Johnson, J. T. Wurtsbaugh and F. H. Ford, to equip a mill.

The G. H. Cambre Oil Company, Alexandria, La., incorporated with $25,000 capital stock by G. H. and M. T. Cambre, has plans for the manufacture of paints, oil and petroleum specialties.

Texas

AUSTIN, TEXAS, November 15, 1913.

The machinery and tool trades are beginning to show improvement in almost all parts of the State, and there are indications that this season will not fall far below the average in industrial activity. Several important irrigation projects in western Texas promise to create a demand for irrigation and pumping equipment. Road building is also active in that section. Texas business interests are hoping for some definite action on the part of the United States in the Mexican situation. While the troubled conditions below the Rio Grande are not affecting industry here to any marked degree, the revolution has stopped American development operations in Mexico.

The Farmers' Cotton Grader Company, Dallas, has been organized with a capital stock of $100,000 for the purpose of manufacturing a cotton grader. Vallie C. Hart is president; Dr. T. E. Granfill, vice-president and general manager; J. W. Strain, second vice-president; W. V. Turner, third vice-president; L. A. Greene, of Greenville, S. C., fourth vice-president; Vallie C. Hart, Jr., secretary; J. W. Strain, treasurer.

With the purchase of a number of dredging machines and concrete mixers by L. B. Westerman, who has the contract to dredge and concrete the canals of the Fort Stockton Irrigated Lands Company, work will be started at once on the project, which will irrigate 35,000 acres of land.

The El Paso Valley Fruit Growers' Association has completed arrangements for the erection of a large canning factory at Clint.

The Tulsa Packing Company, Tulsa, Okla., has increased its capital stock to $120,000 and will greatly enlarge its plant.

B. N. Flickinger, formerly of Benton, Ark., has secured a controlling interest in the Cummer Mfg. Company, of Paris, Texas, manufacturer of folding crates, and the plant will be enlarged and improved. The company's capital stock will be increased from $80,000 to $140,000, and machinery installed to manufacture refrigerators as well as crates. An ice factory of 30 tons capacity will also be added.

The Houston Crate & Box Company, Houston, has been organized with a capital stock of $16,000 by I. Marks, M. C. Cook and K. H. Cawthorn.

The salt plant of B. W. Carrington & Co., at Grand Saline, including copper shop, mill and warehouse, was destroyed by fire last week at a loss of about $70,000. The plant had a capacity of 800 bbl. a day. It will be rebuilt at once, it is announced.

The Pacific Coast

SEATTLE, WASH., November 10, 1913.

Business in Seattle machinery houses is quiet at this time. While the sawmill business is undergoing its usual winter relapse, many of the mill men are taking advantage of the shutdown to make extensive improvements to their plants, increasing the capacity by the addition of new machinery. This business will increase to a large extent during the months of December and January. The trade views the situation favorably, the most encouragement being derived from the continued activity of the Oriental trade and the prospect of great agricultural development. Some activity in public and semi-public improvements is reported, including harbor work, irrigation and hydroelectric development.

W. W. Wood and Carl D. Eshelman, Tacoma, Wash., will erect a veneer plant and box factory to cost $20,000 at Raymond, Wash.

The plant of the Morgan Lumber Mill Company, Toppenish, Wash., was recently destroyed by fire with a loss of about $12,000. The plant was covered by insurance and will be rebuilt.

The Hagin & Van Oven shingle mill at Sumas, Wash., was recently purchased by Cochran & Donahue, Ballard Station, Seattle, and will undergo repairs and new installations to double the capacity. A large amount of machinery will be needed.

The Inland Brewing & Malting Company, Spokane, recently commissioned architect Julius Zittel, Jamieson Block, in that city, to prepare plans for a four-story brick cold storage plant, to cost $20,000.

The North Bluff Mill Company, Blaine, Whatcom County, Wash., has been incorporated with a capital stock of $50,000, and will build a lumber mill.

The North Yakima Milling Company, North

Yakima, Wash., is enlarging its grain elevator and preparing to install new roller mills.

Power users of the mining district around Republic, Wash., are figuring on the installation of a 500-hp. distillate engine, and have appointed a committee to investigate the cost.

The Vancouver Irrigation & Pump Company, Vancouver, Wash., has been incorporated with a capital stock of $55,000 by J. B. Watts, F. M. Lockwood, Owen Singer and W. E. Yates, to manufacture pumping machinery.

The Skagit Power Company, a corporation controlled by Stone & Webster, Boston, Mass., has secured permission to use the water of the Skagit and Cascade rivers for power development. Hydroelectric plants of about 50,000-hp. capacity will be built, with a transmission line to Seattle.

The Townsend Creamery Company, East Seventh and Everett streets, Portland, Ore., will build a three-story, reinforced steel and concrete creamery building. Emil Schacht & Son, Commonwealth Building, are the architects.

The Porter Bros. Lumber Mill Company, Florence, Ore., will make extensive improvements and extensions to its plant at once. J. P. Porter is manager.

Giebisch & Joplin, Portland, Ore., are low bidders for a contract to build the north jetty at the entrance to Tillamook Bay, at a figure of $629,824. Considerable machinery will be required for the work.

The Multnomah Trunk & Bag Company is preparing to rebuild its box factory near Kenton, Ore., which was burned last summer.

The Cœur d'Alene Lumber Mill Company, Cœur d'Alene, Idaho, will equip its plant with new machinery and make other extensive improvements and alterations about the first of the year.

The sawmill of Theron Edwards, Copeland, Idaho, was recently destroyed by fire with a loss of about $10,000. It will be rebuilt.

The Utah Concrete Company, 815-817 McIntyre Building, Salt Lake City, Utah, plans to establish a plant on a site of five acres at Brigham City, Utah, on the Oregon Short Line Railroad, for the manufacture of concrete sewer, irrigation and drain tile. Nelphi L. Morris is president and general manager.

Davis, Cal., will establish a waterworks system.

The Eureka Foundry Company, Eureka, Cal., has transferred its business to five local creditors.

The Morton Gas Engine Company 817-823 Eye street, Fresno, Cal., is erecting a new plant at Hamilton and Anne streets, Fresno, and will be in the market for some special machinery when the plant is completed. H. A. Johnson is secretary and manager.

The Pacific Peat Fuel, Ltd., 25 Stoll Building, Sacramento, Cal., plans to establish several plants for the manufacture of briquetted fuel products from crude oil and peat.

Figures are being taken by the Linde Canadian Refrigeration Company for a large fish refrigeration plant on Lulu Island, Steveston, B. C.

Eastern Canada

TORONTO, ONT., November 17, 1913.

It has been announced by the A. R. Williams Machinery Company, Toronto, that the block of land between Bay and York streets and Lake and Harbor streets has been secured and will be utilized for a foundry plant. The main building will be six stories.

The J. H. Tromanhauser Company, Ltd., Toronto, has been incorporated with a capital stock of $100,000 by J. F. Boland, F. J. Boland and others to construct bridges, wharves, etc.

The Rock & Power Machinery, Ltd., Toronto, has been incorporated with a capital stock of $500,000 by Alan Gilmour, Archibald Cochrane and others to manufacture machinery.

The Ramsden Sand, Gravel & Brick Company, Ltd., Toronto, has been incorporated with a capital stock of $100,000 by C. H. Rooke, E. W. Bickle and others to manufacture brick, etc.

The ratepayers of Stamford township, Ont., passed a by-law to grant $10,000 for a water plant.

The ratepayers of Petrolea, Ont., passed a by-law to loan $30,000 to the Petrolea Wagon Company.

The Lake Superior Dry-Dock & Construction Company, Ltd., Sault Ste. Marie, Ont., has been incorporated with a capital stock of $1,500,000 by J. S. Lovell, Robert Gowans and others.

Jones, Girouord & Co., Ltd., Ottawa, Ont., have been incorporated with a capital stock of $50,000 by A. M. Jones, E. C. Girouord and others to develop power.

John Heard & Co., Ltd., St. Thomas, Ont., have been incorporated with a capital stock of $75,000 by William Heard, Robert Heard and others to manufacture lumber.

The Morrison Construction Company, Ltd., Ottawa, Ont., has been incorporated with a capital stock of $100,000 by K. A. Morrison, T. A. Burgess and others to build tunnels, harbors, etc.

The Remington Arms-Union Metallic Cartridge Company, Bridgeport, Conn., has started work on its new Canadian plant at Windsor, Ont. The buildings are to be of the heavy type of brick, with roof of sawtooth construction. The roofs and gutters will be entirely of Asbestosteel, a combination of concrete and rectangularly corrugated sheets of asbestos protected metal, which is a new type of construction for roofs and curtain walls evolved by the Asbestos Protected Metal Company, Beaver Falls, Pa.

The Gull Lake Lumber Company, Ltd., Gravenhurst, Ont., has been incorporated with a capital stock of $100,000 by T. H. Wilson, W. H. Ford and others to manufacture pulp and paper.

The William Briscall Company, manufacturer of stained and art glass, Buffalo, has established a Canadian branch plant at Bridgeburgh, Ont., on the Niagara River, opposite Buffalo.

The Town Council of Brockville, Ont., has authorized an expenditure of $69,000 for improvements to be made to the municipal electric light and power plant.

The British Manufacturers' Association of Canada, Ltd., Montreal, has been incorporated with a capital stock of $10,000 by L. A. David, L. J. M. Dugas and others to manufacture electrical and mechanical apparatus.

The Montreal Council passed a by-law to grant $2,000,000 for the purpose of establishing a municipal electric plant.

Roger Miller & Co. (P. E. I.), Ltd., Montreal, have been incorporated with a capital stock of $200,000 by W. R. L. Shanks, G. R. Drennan and others to build machinery, etc.

The Dominion Bridge Company, Montreal, closed a contract for the steel work for the new 23-story Royal Bank building, which is now under way at the corner of King and Yonge streets, Toronto. The contract, it is stated, is the largest of its kind ever awarded in Canada.

The Ste. Agathe Lumber & Construction Company, Ltd., Ste. Agathe des Monts, Que., has been incorporated with a capital stock of $300,000 by L. E. Parent, J. A. Paré and others to operate saw mills, shingle mills, etc.

La Compagnie Jutras, Ltd., Victoriaville, Que., has been incorporated with a capital stock of $100,000 by C. B. Jutras, J. W. Jutras and others to manufacture metal and wood articles.

The Hull Iron & Steel Foundries, Ltd., Hull, Que., has been incorporated with a capital stock of $250,000 by A. H. Coplan, Ottawa, Ont., M. P. Walters and others.

E. G. M. Cape & Co., Ltd., Montreal, have been incorporated with a capital stock of $500,000 by Lawrence Macfarlane, C. A. Pope and others to construct power plants, etc.

Western Canada

WINNIPEG, MAN., November 14, 1913.

Business in machinery was a little better this week than previously. Considerable trade is reported in parts for repairs and additions to factory equipment. There also seems to be a better tone as regards inquiries for information about machinery for new industries under contemplation. Leading authorities in western Canada industrial circles predict activity next spring. Already plans are under way for considerable industrial expansion in these provinces.

W. H. McWilliams, Winnipeg, is the president of a newly organized Winnipeg company formed to take over the Canadian rights of the Bull tractor, and to manufacture it here. The company will be capitalized at $1,000,000, and expects to be manufacturing the tractors next spring.

The Empire Water Works Supply Company of Canada, Ltd., Winnipeg, Man., has been incorporated with a capital stock of $100,000 by G. Irving, G. F. Irving and others to manufacture waterworks supplies.

The Winnipeg Power Company, Ltd., Winnipeg, Man., has been incorporated with a capital stock of $1,000,000 by Ernest Frith, C. W. Chappell and others to generate electricity.

The ratepayers of Dauphin, Man., passed a by-law

to grant $20,000 for the extension of the electric light and power plant.

The ratepayers of Beausejour, Man., passed a by-law to grant $3000 for an electric light system.

F. L. Bishop, Strome, Alberta, is preparing to erect a small flour mill at Wilkie, Sask.

The sawmill and lumber yards of the Canadian Collieries, Ltd., at Cumberland, B. C., burned this week with a loss of about $100,000. This is one of the many MacKenzie & Mann properties. The plant will be rebuilt.

It is reported that the Riverside Lumber Company, Ltd., Calgary, Alberta, which operates a saw mill at New Michel, B. C., is planning to erect a larger plant at a point on Kootenay Lake, B. C.

W. Johnston, sash and door manufacturer, Vancouver, B. C., contemplates enlarging his plant in the near future.

It is expected that the Empire Lumber Company, Ltd., which is building a sawmill at Cowichan Lake, B. C., will install another large mill at Crofton, B. C., southeast from Cowichan Lake.

The Grand Forks Canning Company, Grand Forks, B. C., has just completed arrangements for the erection of a canning factory 50 x 125 ft., at an approximate cost of $14,000.

C. C. Yount, vice-president of the Empire Lumber Company, has announced that the company will erect a new mill at Osborne Bay, Vancouver Island, B. C., with a daily capacity of 250,000 ft.

The new Grand Trunk Pacific floating dry dock at Prince Rupert, B. C., will be one of the largest and best supplied in the world, and will be electrically operated throughout. The contract for the electrical equipment, which has been awarded by the Grand Trunk Pacific to the Canadian General Electric Company, Ltd., includes two 200-hp. and four 100-hp. variable speed induction motors, with full automatic control, for operating the pumps on the dock. The power will be produced by two 1250-kva. Curtis steam turbines, with complete condensing apparatus. The exciters for the main turbine generators will consist of three 35-kw. turbine-driven generators and one motor generator set. The foundry, machine shops and shipyards will be equipped with motor-driven tools, requiring motors ranging from 10 to 60 hp. The contract for electrical equipment also includes all necessary power and light transformers.

Government Purchases

WASHINGTON, D. C., November 13, 1913.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until November 9, schedule 6011, for one bolt cutter, one tool grinder, one three-ton hoist, one double punch and shear, one double and vertical punch and shear, all for Charleston; schedule 6031, two tool-room lathes for Philadelphia; schedule 6032, one dry and wet grinder, one tool-room lathe, one 15-in. turret lathe, one 24-in. turret lathe, one flat turret lathe and two arbor presses, all for Philadelphia.

Bids will be received at the United States Engineer Office, Cleveland, Ohio, until December 10, for constructing the steel and iron hull dipper dredge Marietta. Address H. Jervey, lieutenant-colonel, engineers.

Bids will be received by the supervising architect, Treasury Department, Washington, until December 1, for a pumping plant for the post office at Oklahoma City, Okla.

Bids were received by the commissioners of the District of Columbia, November 12, for furnishing and delivering one 42-in. boring and turning mill for use in the water department as follows:

Gisholt Machine Company, $2580; alternate, $2670; Kemp Machinery Company, $2417.50, 60 days; Manning, Maxwell & Moore, $2380; Bullard Machine Tool Company, $2100; Aumen Machinery Company, $2575; Fairbanks Company, $2381; B, $2356; C, $2478; D, $2454; Niles-Bement-Pond Company, bid A, 42-in., $1920; B, $2120; 44-in., bid C, $2640; B, $2790; deliveries, A and B, 75 days; C and D, 105 days.

Bids were received by Bureau of Yards and Docks, Navy Department, Washington, November 8, for one 100-kw. motor-generator set and switchboard accessories for the United States naval station, Pearl Harbor, H. T.:

Item 1, price for motor-generator set and accessories, complete; 2, in accordance with the spirit of the specification, but with such modifications as may be desired by bidders.

Western Electric Company, item 1, $3300; Westinghouse Electric & Mfg. Company, item 1, $2986; 2, $3156; General Electric Company, item 1, $2896; 2, $2705; Ridgeway Dynamo & Engine Company, item 1, $2749.

The New Commission on Industrial Relations

Considerable interest is being manifested in the new Commission on Industrial Relations, at the head of which President Wilson has placed Frank P. Walsh. It is evidently the purpose of this commission to go after practical results and not unrelated statistics. Mr. Walsh is essentially a practical man and he is intensely interested in his new work. He has arranged to abandon his lucrative law practice in Kansas City, Mo., for a time. Tentative plans have been adopted by the commission and four departments have been roughly blocked out. F. W. Bird, Berkeley, Cal., has been placed at the head of the first. The scope of these several departments is described as follows by Mr. Walsh:

"The very first work we had to do—and that Mr. Bird has taken charge of—was to ascertain what departments at Washington had already done along the lines we are to follow, and map out just what has to be done by us. Many of the Federal departments have been engaged on researches which touch ours.

"In the second department—the department of private agencies—no appointment has yet been made, the work at present coming under the supervision of Mr. Lauck. The province of this department is to make a complete survey of the labor unions, the employers' associations and the other private agencies which make or refuse to make trade agreements with unions. Its researches are expected to determine whether the commission will recommend to Congress the passage of laws compelling arbitration, or whether it will recommend mediation and arbitration, with a uniform method of legalizing resultant agreements.

"The third department of the Commission is dealing with general labor conditions and the causes of industrial unrest. It has been placed in charge of Basil W. Manley. This division will complete a survey of unorganized labor forces. The economic causes which produce revolutionary organizations, and which encourage syndicalists and other anarchistic groups, will be its special subjects.

"Consideration of the legal machinery having to do with industrial relations and their improvement is to be the task of the fourth department. It is also temporarily without a head. At present it has one investigator at work, Mrs. Crystal Eastman Benedict, of New York, who assisted in the Pittsburgh survey, and has written on the subject. In this department we are studying the effects of judicial decisions on industrial questions and how statutes affecting labor are being construed by the courts. We are trying to determine the part common law plays in industrial disputes, and to sift the oft-repeated reports that the courts are unfair to organized labor or are unfair to capital. Any understanding of the influence of the judiciary in these matters involves a survey of all the judicial decisions in injunction cases. Constructively we will try to find out how much friction may be allayed by modifying court rules and procedure, and what changes may be made in the common law. The trend of the courts in sustaining laws for the protection of workers will be looked into, and the practicability of the Government's establishing free legal aid bureaus."

Allis-Chalmers Operations Show Profit

The income account of the receiver of the Allis-Chalmers Company, as reported to the New York Stock Exchange for the period from April 6, 1912, to April 15, 1913, inclusive, is as follows:

Sales billed	$9,933,390
Cost, including maintenance and depreciation	8,647,023
Factory profit	1,286,367
Selling, publicity, administrative and general expenses	1,238,725
Net manufacturing profit	47,642
Other income, less interest, etc	210,223
Net profit	$257,865

The income account of the receiver of the Allis-Chalmers Company from October 1, 1912, to April 15, 1913, the date of the termination of the possession of the receiver, and of the operations of the Allis-Chalmers Mfg. Company from April 16, 1913, to September 30, 1913, shows a total net profit of $601,310.